What is strength-duration curves? Write in detail the technique of doing it.

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Definition:
The amount of electricity required to produce an AP depends on the type of nerve and can be represented by the nerve's strength-duration curve. The strength-duration curve for a nerve is a graphic representation of the minimum combination of current strength (amplitude) and pulse duration needed to depolarize that nerve.
Strength duration/Intensity duration curve shows the relationship between the magnitude of the change of stimulus and the duration of the stimulus. The curve provides valuable information regarding the state of excitability of nerve lesion. It should be done only after 21 days following nerve injury.

Technique of doing SD Curve:
Following are the steps to follow to measure SD Curve
1. Receiving the patient
2. Knowledge of condition
3. Preparation of trays
4. Preparation of apparatus—Diagnostic electrical stimulator to be used.
5. Positioning of the patient
6. Position of Physiotherapist
7. Checking for local contraindication
8. Reducing skin resistance.
9. Checking of apparatus
10. Correct placing of pads and electrodes

Instructions to the patient:
– Feel of current
– Instruction to inform if any discomfort occurs
– Warning not to touch anything
– Regulating current—Interrupted galvanic current
– Palpating tendon
– Winding up.

Other special points:
– Diagnostic stimulator to be used
– Interrupted galvanic current indicated
– Start with longer duration (from 100/300 ms)
– Select small muscle or select a muscle, which has distinguished action, compare with 3 muscles.

For Radial Nerve - Extensor indicis
For Median Nerve - Abductor pollicis brevis
For Ulnar Nerve - Abductor pollicis
For Lateral Popliteal Nerve - Peroneus longus

Shape of the Curve

Normal innervation
When all the nerve fibers supplying the muscles are intact, the strength duration curve has a shape characteristic of normally innervated muscle. The curve is of this typical shape because the same strength of stimulus is required to produce a response with all the impulses of longer duration, while those of shorter duration require an increase in the strengths of the stimulus each time the duration is reduced.

Complete Denervation

When all the nerve fibers supplying a muscle have degenerated, the strength duration produced is characteristic of complete denervation. For all impulses with duration of 100 ms or less the strength of the stimulus must be increased each time the duration is reduced and no response is obtained to impulses of very short duration. So that the curve rises steeply and is further to the right than that of a normally innervated muscle.

Partial Denervation

1. As impulses shortened—denervated fibers respond less readily. So that a stronger stimulation is required.
2. With impulse of shorter duration—innervated fibers responses. When some of the nerve fibers supplying a muscle have degenerated while others are intact, the characteristic curve obtained clearly indicates partial denervation. The right-hand part of the curve clearly resembles that of denervated muscle, the left-hand part that of innervated muscle, and a kink is seen at the point where the two parts meet.