

A REVIEW OF TENS IN OROFACIAL DISORDERS

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TENS is used extensively in health care to manage painful conditions because it is cheap, safe and can be administered by patients themselves. Success with TENS depends on appropriate application and therefore patients and therapists need an understanding of the principles of application.

A Transcutaneous Electrical Nerve Stimulator, more commonly referred to as a TENS unit is an electronic device that produces electrical signals used to stimulate nerves through unbroken skin. The name was coined by Dr. Charles Burton.

HISTORY

Electrical stimulation for pain control was used in ancient Greece, 63 A.D. It was reported by Scribonius Largus that pain was relieved by standing on an electrical fish at the seashore. In the 16th through the 18th century various electrostatic devices were used for headache and other pains. Benjamin Franklin was a proponent of this method for pain relief. In the 1900's a device called the electreat, along with numerous other devices were used for pain control.

The first modern, patient-wearable TENS was patented in the U.S.A. on June 18, 1974 (patent 3,817,254). It was initially used for testing the tolerance of chronic pain patients before implantation for electric stimulation in the spinal cord dorsal column.

A number of companies manufacturing TENS appeared after the commercial success of the Medtronic device became known. The neurological division of Medtronic, founded by Don Maurer, Ed Schuck and Dr. Charles Ray, developed a number of applications for implanted electrical stimulation devices for treatment of epilepsy, Parkinson's disease, and other disorders of the nervous system. Maurer founded Empi, Inc. in 1977, and in the late 1980's purchased the TENS product line from Medtronic.

MECHANISM OF ACTION & PHYSICAL PRINCIPLES

Based on GATE CONTROL THEORY given by MELZACK & WALL in 1965.

- TENS stimulation causes a release of endorphins (methionine enkephalin, dynorphine A) which attaches to opiate receptors and block transmission of noxious stimuli
- TENS alters the gate to increase circulation, decreases retention of toxic metabolites, inflammation & reduces

edema

- Studies indicate role of serotonin, dopamine, & norepinephrine in stimulation induced analgesia

TYPES OF TENS

- The electrical characteristics of TENS are chosen with a view to selectively activate different populations of nerve fibres as this is believed to produce different analgesic outcomes.
- **Based on this TENS could be of three types:**
 1. **CONVENTIONAL TENS:** High frequency, low intensity TENS or sensory TENS. Activate selectively large diameter fibres without concurrently activating small diameter fibres or muscle efferents. Delivers between 10-200p.p.s. & 100-200µs with pulse amplitude titrated to produce a strong comfortable and non painful paraesthesia.
 2. **ACUPUNCTURE LIKE TENS:** Defined as induction of forceful but non-painful phasic muscle contractions at myotomes related to origin of pain. Purpose of AL-TENS is to selectively activate small diameter fibres arising from muscles by induction of phasic muscle twitches.
 3. **INTENSE TENS:** Activate small diameter cutaneous afferents by delivering TENS over peripheral nerves arising from the site of pain

SPECIFICATIONS OF TENS UNIT

WEIGHT	50 – 250 gms
DIMENSIONS	6 X 5 X 2 c.m (SMALL DEVICE) 12X9X4 c.m (LARGE DEVICE)
PULSE WAVE FORM (FIXED)	MONOPHASIC SYMMETRICAL BIPHASIC ASSYMETRICAL BIPHASIC
PULSE AMPLITUDE (ADJUSTABLE)	1–50 mA into a 1 kΩ load
PULSE DURATION	10 – 1000 µs
PULSE FREQUENCY	1- 250 pps
PULSE PATTERN	CONTINUOUS / BURST
CHANNELS	1 OR 2

TENS UNIT: Three parts

1) STIMULATOR:

Transistorized, battery operated pulse generator

2) LEADS:

A pair of insulated wires



that connect the Stimulator to the electrodes

3) ELECTRODES:

Two types-

- Carbon rubber
- Self adhesive

METHOD

- Used in pairs & positioned so that they lie along the main directions of nerves in the part to be treated.
- Applying the carbon electrodes using the jelly or self electrodes by peeling off waxing.
- Connect the electrodes to stimulator by means of leads, switch on & adjust the stimulator according to the procedure set out.

TIMING & DOSAGE

Clinical trials report that maximum relief occurs when the TENS device is switched on & that analgesic effect usually disappears quickly once device is switched off. Thus, patients using conventional TENS should be encouraged to use TENS whenever the pain is present. In a outpatient clinic a dosing regimen of 20 minutes at daily, weekly or monthly intervals is likely to be effective. Natural fluctuations in symptoms & the patient's expectations of treatment duration may alter the duration & timing of treatment.

APPLICATIONS IN GENERAL

- **Relief of acute pain:**
 - Post operative pain
 - Musculoskeletal pain
 - Bone fractures
- **Relief of chronic pain:**
 - Low back pain
 - Arthritis
 - Metabolic bone pain
- **Antiemetic effects:**
 - Post operative nausea associated with opioids
 - Nausea associated with chemotherapy.
 - Morning sickness.
 - Motion / travel sickness.
- **Improving blood flow:**
 - Reduction in ischemia.
 - Raynaud's disease and diabetic neuropathy.
 - Improved healing of wounds and ulcers.

APPLICATIONS IN DENTISTRY

- Myofacial pain dysfunction syndrome
- Temporomandibular Joint Pain
- Facial neuralgias
- Acute orofacial pain
- Sedation



- Improving salivary production

CONTRAINDICATIONS:

- Undiagnosed pain (unless recommended by a medical practitioner)
- Pacemakers (unless recommended by a cardiologist)
- Heart disease (unless recommended by a cardiologist)
- Epilepsy (unless recommended by a medical practitioner)

Pregnancy :

- First trimester (unless recommended by a medical practitioner)
 - Over the uterus
- Do not apply TENS:
 - Over the carotid sinus
 - On broken skin
 - On dysaesthetic skin
 - Internally (mouth)

CONCLUSION

- TENS has definite, but at this time limited use in Dentistry because of unawareness in conception.
- TENS can be useful adjunct to more conventional treatments in case of MPDS, NEURALGIAS, TMJ pain & improving salivary production.
- TENS has questionable benefits in producing sedation, cavity preparation & in the treatment of acute orofacial pain but still use can not be ignored
- A significant research has been conducted on the use of TENS in general, but in DENTISTRY it still needs efforts to prove the uses of TENS.

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