

EXPERIENCE OF TRANSCUTANEOUS DYNAMIC ELECTROSTIMULATION APPLICATION WITHIN COMPLEX TREATMENT OF DISEASES AND TRAUMATIC INJURIES OF MUSCULOSKELETAL SYSTEM AND PERIPHERAL NERVOUS SYSTEM

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All musculoskeletal system and peripheral nervous system diseases and traumatic injuries in acute period are characterized by acute pain, edema, soft tissues hemorrhage, extravasations and infusions into joint cavity, inflammatory reaction and dysfunction. Analgesics use doesn't always resolve the problem of acute pain syndrome stop.

Last few years new low-frequency electro therapy method – dynamic electroneurostimulation method – is implemented; it has clearly defined analgesic, anti-edema, anti-inflammatory, and vasoactive influence.

DENS is method of impact on coverlet receptor system, on biologically active points, on sensitive afferent conductors in pain zones by very short-termed (400 mcs) neuron-like (bipolar) electrical impulses of low frequency (10 to 200 Hz) and low intensity (on average 200 to 400 mcA).

Duration and frequency of current pulses used for DENS are comparable with frequency and duration of pulses in thick myelinated afferent fibers having big velocity of pulsation. Thanks to flow of rhythm regulated afferent electric pulsation created during the procedure neurons of posterior horns substantia gelatinosa are stimulated, and their perception of nocigenic (pain) information coming from pathology center through thing non-myelinated nervous fibers with low velocity of pulses conducting is blocked.

Analgetic structures neurons activation is accompanied with supraspinal system stimulation and discharge of endorphins by putamen, by digestive apparatus, endocrine glands; the result is pain pulsation inhibition. Acute pain weakening and, to a lesser degree, chronic pain weakening is marked already during the procedure and then is kept during 1 to 2 hours after the procedure.

Appearing as an answer on rhythmic stimulation the coverlet muscles and skin arteriole unstriped muscle fibrillation activates destruction process of algogenic substances (bradykinin) and mediators (acetylcholine, histamine) in pain center. Besides, analgesic effect from DENS is also related to local blood-flow enforcement, and trophy activation that remove perineural edema and thus have pathogenetic influence on reason of the pain syndrome.

Besides the analgesia appearing during the procedure, as a result of clear vasoactive effect blood circulation in ischemic tissues intensifies, metabolic and trophic processes in impact zone and deeply located tissues segmental connected with corresponding skin areas. Because of local, segmental and general organism reactions its regulatory systems synchronization is reached. Stimulating impulses have regulative influence on organism, mobilize reserve functional tissue elements and recover disturbed functions, help to switch rapidly the humoral and immune mechanism, remove energy and information block, and restore lost links between pathologic zones and all control systems of the organism.

During DENS following medical effects are clearly defined: analgesic, anti-edema, anti-inflammatory, trophic, resolving, metabolism stimulating, stimulating regenerative process of trophic ulcer and weakly healing injuries, normalizing hormone state, and immunomodulating.

After the DENS application for treatment of musculoskeletal and nervous system diseases and injuries for 2 to 4 hours pronounced analgesic effect appears. Repeated application of 3-4 procedures a day during several days may completely remove acute pain syndrome or, as a last resort, effectively reinforce analgesic and anti-inflammatory preparations influence, contribute to lost function recover.

Repeated application during 24 hours of the DENS method is allowed because of low intensity of impulse electric current. The method is easily transmitted by patients and having injuries of different severity degree, older people and children. The method application is not contra-indicated when there is Ilisarov's apparatus on fracture, intraosteal or on-bone osteosynthesis. During impact of low frequency and intensity impulse, generated by DENS apparatuses on metal implants electrolysis products in the amount that can evoke cauterizing effect (chemical injury) next to metal foreign element don't form.

During several years home industry produces apparatuses for dynamic electroneurostimulation of "DENAS" and "DiaDENS" models. Apparatuses are made in several modifications, and widely used in clinics and at home. The apparatuses are portable and electrically safe.

The more interesting model for us is "DiaDENS-PC". The apparatus lets conduct "testing" – diagnostic investigation of skin ohm resistance and identify pain zones and zones of "latent pain". The testing conducted before and after the procedure, at the beginning and in the end of treatment course, is objective method of conducted treatment efficiency control.

In the apparatus frequency range is widened from 1 Hz to 200 Hz, that allows DENS method use in case of acute pain (140 and 200 Hz frequencies), chronic pain syndrome (60 and 77 Hz frequencies), have regulative effect on tone of unstriated muscles of blood vessel and lymphatic and internal (10 Hz frequency). "DiaDENS-PC" model has a regime of frequency modulation "77 10". Output for external punctual electrode connection is provided for electro puncture (reflex therapy) and diagnostic by Voll conduction. Besides there is an output for paraorbital electrode connection to impact on skin receptor system around eyes.

During period from 2003 to 2006 287 patients aged from 28 to 68 with musculoskeletal and nervous system diseases and traumatic injuries were under our observation.

In cases of contusion, sprain, and rupture of joint-ligament apparatus and joint meniscus injuries (27 persons) after intensive DENS therapy during 10-14 days hemorrhage dissolved, soft tissues edema and joint coats irritation (synovitis) disappeared, pain syndrome significantly regressed, and joint and extremity function restored. Pain syndrome regress, hemorrhage dissolving, and function restoration began 5-7 days faster than similar traumatic injuries in persons who didn't get DENS and other physiotherapeutic methods.

In case of open and simple long bones fractures (47 persons) DENS was combined with exercise therapy. Rehabilitation period reduced on average for 5 days in comparison with patients of similar group who didn't get DENS within complex treatment. Good results were got in 87% of patients, satisfactory – in 13%. There were not negative results.

Group of patients with joint diseases was formed of people with deforming arthrosis of big joints, with gouty and psoriatic arthritis (58 persons). Good DENS efficiency was got in 76% of patients, satisfactory – in 24%. Negative results of the DENS application were not marked.

The larger group got DENS were patients with spinal degenerative injuries (129 persons). After the DENS method course treatment, including "DiaDENS-PC", in 75% of patients with dorsopatia there was a good therapeutic effect, appearing in acute pain syndrome regression, muscle-tone syndrome liquidation, spine and injured nerve function improvement and blood circulation in vertebral arteries improvement. In 19.1% of cases there was satisfactory result, when pain and muscle-tone syndrome intensity significantly reduced, but didn't disappear. In complex treatment of such patients other physiotherapeutic methods were included. 5,3% of patients haven't got noticeable effect.

This group included patients with spinal discogenic injuries when herniations of intervertebral disks in neck zone were, according to MRT, 4 mm, and in lumbosacral zone – 8-12 mm.

The rest group included patients with traumatic compressive-ischemic plexopatia of upper and lower extremity (12 per.), traumatic vertebrogenic neuropathy of median nerve (8 per.), polyneuropathy of viral aetiology (shingles) – 6 persons. In all cases good clinical effect was got that exceeded treatment results of patients who didn't get DENS.

Summary:

1. DENS application for treatment musculoskeletal and peripheral nervous systems diseases is highly effective physiotherapeutic method.
2. “DiaDENS-PC” model is a multifunctional device allowing conducting an assessment of organism systems functional state and therapy in different medicine areas. The device has good design; it is electrically safe, simple and comfortable in use.
3. DENS may be recommended for application in wide clinical practice by doctors of different specialties as effective method of analgesia by urgent indication, and for use DENS method by patients at home after consultation with physiotherapist.