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Title : **Enhancing Awareness and Management of Carpal Tunnel Syndrome Among Medical Professionals and Athletes**

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Key names / dates / info :

→ **thorough explanation of CTS (physiology, consequences, symptoms, diagnosis, treatments)**

→ **referring to CTS in athletes (cyclists)**

- referring to Saudi Arabia (2009-2011) study on CTS symptoms distribution (by age)

- diagnosis : details on Phalen and Tinel's tests, and on ultrasonographic examination

- **explanation of ECTR and OCTR surgical techniques, and strong focus on treatments for CTS**

Key words : median nerve; entrapment neuropathy ; activity and health; carpal tunnel syndrome; physical activity; cycling; Phalen test ; Tinel test ;

Review:

Intro : CTS data & info :
- 3.8 individuals out of a 1000 in the general population affected by CTS
- women more than men ; age : 40 to 60.
- 2 potential treatments : surgical/non surgical, depending on severity of symptoms

CTS pathophysiology :
- description of CT physio (median nerve compression within carpal tunnel, as space is narrow, shared with 9 flexor tendons, all bathing in synovial fluid ; carpal tunnel enclosed by 8 carpal bones + transverse ligament)
- 3 causes of CTS : increased pressure, mechanical trauma, and ischemic damage
- physiological consequences of repetitive wrist motions : wrist flexion increases fluid pressure (8 times), causing change in blood-nerve barrier hence endoneurial edema development and demyelination

CTS consequences & treament overview:
- may be severe
- surgical treatment more risky than non surgical treatment
- if treated surgically : risk of neuroma in the palmar cutaneous branch of the median nerve
- if treated non surgically via corticosteroids injections : less risks ; if treatment = physical therapy : hardly any risk
- if non treated : risks of median nerve damage (causing increased pain and palm disability), loss of sensation in fingers, muscle weakness and atrophy of thumb due to pain and numbness.
- surgery will be chosen if non surgical solutions prove unsuccessful

CTS symptoms :
- numbness, tingling and discomfort in the area innervated by the median nerve
- triggered by activities such as driving or holding a telephone
- pain worse at night (hence poor sleep quality) ; relief by shaking hand

- sensory fibres more sensitive than motor fibres hence first symptoms are pain and paralysis, then muscle weakness (causing poor grip strength)
- pain disappearance potentially wrong indicator – may lead to worsening situation with permanent loss of sensation

→ Study in Saudi Arabia : people over 50 will suffer more in the 3 lateral fingers ; people under 50, at the level of their wrists ; no significant difference in the distribution of CTS symptoms at the level of the fingertips, the whole hand and the forearm between patients

CTS diagnosis :

- relies on medical history (duration, location, severity, progression of symptoms, exacerbating factors etc) AND physical examination (sensory examination, assessment of potential thenar muscle atrophy, provocative tests (Phalen's and Tinel's), nerve conduction studies, electromyography, ultrasonographic examination).

CTS in athletes :

- cyclists' median nerve injuries (caused by the way they hold their handlebars)
- online sports egamers' median nerve injuries (caused by improper work practices) (study conducted in 2019)

→ recommendations : alter positions, use ergonomic mouse pads, peform adapted physical exercises for wrists

Treatments in details :

- low energy laser therapy to increase cellular oxygen consumption, elevate the level of serotonin and endorphin in tissues, enhance blood circulation and stimulate ATP production by mitochondria ; achieving result in anti-swelling, antiinflammatory and regenerative effects on tissues
- sonotherapy as ultrasound waves possess anti-inflammatory properties, facilitating the regeneration of nerves and enhancing nerve conductivity ; achieving satisfactory improvement or complete remission of symptoms with 74 % of concerned athletes.
- shock wave therapy achieve results reducing pain, enhancing functionality and improving electrophysiology measurements for athletes suffering from mild-tomoderate CTS
- kinesiotherapy, massage and soft tissue mobilization treatments enhance flexibility of muscles, tendons, ligaments and the median nerve
- immobilisation via an orthosis to reduce pain prior to surgery
- surgery for more important/advanced cases of CTS if nerve damage has been identified through electrodiagnostic test
- Prednisone (corticoid) to help reduce symptom severity
- injections of glucocorticosteroids, administered locally ; both ultrasound-guided injections or landmark-guided injections compared in a study show that ultrasound-guided injections are more efficient. Side effects are very rare.

→ surgery stands out as the most efficient, long-term treatment. Involves reducing the pressure in the carpal tunnel.

→ 2 techniques : OCTR (open carpal tunnel release) and ECTR (endoscopic carpal tunnel release).

→ the surgeon makes an incision at the base of the hand and then cuts the transverse carpal ligament, which eliminates the mechanical pressure on the median nerve.

→ Will apply if symptoms persist after a long period of non-surgical treatment and when EMG shows severe damage to the median nerve, or if the person experiences permanent loss of movement or sensation.

->Use of orthoses postoperatively may contribute to the formation of adhesions

→ Endoscopic method of decompression of the carpal tunnel (ECTR - endoscopic carpal tunnel release) offers faster recovery than OCTR

Notes:

→ Comprehensive explanation of CTS
→ Alluding to CTS in athletes, which needs to into further details (for sports related research work)