

Double Crush Syndrome: Are we Still Reinventing the Wheel

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Abstract

Double Crush Syndrome refers to the coexistence of a proximal and a distal compressive lesion along the course of a nerve whereby the proximal compression makes the distal segment of the nerve vulnerable to an otherwise subclinical compression. In presence of two lesions, it is possible that one of them may get under-addressed because of the over-attention to the one which is readily visible to the eye. On the flip side, over-indulgence with the syndrome may lead to multiple investigations and unnecessary interventions. Notwithstanding, an astute clinician needs to be aware of this entity and plan out his investigations and interventions with rationality and in an algorithmic manner to steer clear off the controversies which are still hounding this clinical syndrome.

Keywords: Clinical Syndrome; Subclinical Compression; Distal Segment; Algorithmic Manner

Abbreviations: MRI: Magnetic Resonance Imaging; NRS: Numerical Rating Scale; DCS: Double Crush Syndrome; CTS: Carpal Tunnel Syndrome; CR: Cervical Radiculopathy; DRG: Dorsal Root Ganglion.

Letter to the Editor

A 41-year-old female was referred to our pain clinic with complains of neck pain radiating to lateral side of right arm, forearm and hand involving the lateral 3 fingers. She also complained of decreased grip and forearm flexion strength on right side. No obvious decrease in sensation was noted. No tenderness over the area of cervical facet columns could be elicited and Spurling's sign was negative. Magnetic resonance imaging (MRI) of the cervical spine showed moderate disc bulge at C5-6 and mild disc bulge at C6-7. As the patient had already turned down the surgical option, right sided interlaminar cervical epidural injection was performed with 40mg triamcinolone in 4ml 0.375% bupivacaine for symptom relief. 2 weeks post-procedure the patient reported definite improvement in her neck and arm pain (numerical rating

scale (NRS) 3 from 8). However, there was persistence of numbness in the 3 fingers and pain in her forearm and hand (NRS 6). Additionally, she complained of nocturnal pains and pain during household chores involving too much of movement at the wrist. Phalen's test was positive and Tinel's sign was negative. Nerve conduction study was advised which showed increased latency of right median nerve at the wrist, suggesting possibility of coexisting carpal tunnel syndrome (CTS). A diagnosis of Double Crush Syndrome (DCS) was made. Repeat cervical epidural injection along with ultrasound guided hydro-dissection of median nerve under the flexor retinaculum at the wrist was performed. Subsequently, at 4 weeks of follow up the patient reported remarkable improvement in pain scores (NRS 2). There was no complication attributable to the above procedures.

The above case report intends to highlight an important but frequently overlooked entity of DCS. DCS refers to coexistence of dual compressive lesions occurring along the course of a nerve wherein the proximal compressive lesion makes the nerve vulnerable to an otherwise subclinical

compressive lesion at the distal site [1]. Coexistence of cervical radiculopathy (CR) and CTS has been described as the most common type of DCS encountered in clinical practice [2]. Both CR and CTS have overlapping clinical symptoms and signs [3]. In addition, the reliability of “special tests” like Spurling’s test, Phalen’s test and Tinel’s sign is low. Thus, in presence of two coexisting pathologies, one of them may get overlooked, especially with the availability of a radiological investigation which may tilt the diagnosis in favour of the one “which is readily visible to the eye”.

Many plausible explanations regarding occurrence of DCS have been proposed viz.

- Impaired axoplasmic transport.
- Up or down regulation of ion channels.
- Inflammation of the dorsal root ganglion (DRG).
- Neuroma-in-continuity.
- Interruption of lymphatic or venous drainage due to compressive pathology leading to perineural or endoneurial edema ending in compromised axoplasmic circulation, demyelination or, in severe cases, axonal loss.
- Entrapment of nerve at proximal site leading to shear stress at distal site.
- Entrapment of nerve leading to weakness and decreased muscle pump which leads to limb edema and subsequent entrapment at vulnerable areas.
- Primary neural insult resulting in elaboration of catabolic metabolites, which then flow to distal areas along the axon and cause inflammation at the distal vulnerable site [2,4].

Several insights have developed over the years in the pathophysiology of DCS since its first proposition in 1973 [5]. From their experimental study involving canine sciatic nerves Nemoto K, et al. [6] suggested the theory of “summation injury” which stated that the impact of double lesion was greater than the sum of separate individual lesions [6]. This idea was later condoned in a similar study involving rat model by Dellon AL, et al. [7]. Dahlin LB, et al. [8] floated a concept of “reverse DCS” whereby a distal lesion along a nerve predisposes it to vulnerability at proximal compression site by impairing the retrograde axoplasmic flow [8]. “Multiple crush syndromes” can also be encountered especially in those nerves which pass through multiple compressive sites (eg. ulnar nerve which can get compressed

at thoracic outlet, at the elbow in the cubital tunnel or at the wrist in the Guyon’s canal) [2].

The first report of “Double Crush Syndrome” in 1973 by Upton, et al. [5] had raised many eyebrows then. However, there have been a plethora of observational and experimental studies ever-since which have established DCS as a well-defined clinical entity. The controversies surrounding its existence is now only of historical importance. In the present era indulging in discussions regarding existence of this clinical entity would be nothing short of trying to reinvent the wheel. Instead, an astute clinician should have a keen eye and should investigate actively for DCS if the symptoms and signs pose slightest of suspicion.

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