Keynote Forum

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Neurological recovery following traumatic spinal cord injuries

The incidence of traumatic spinal cord injuries (TSCI) is very small 10-50/million/year, however the effects: medical, physical, psychological, social, financial, vocational and environmental are dramatic & devastating for the patient, partner, and family members' relationships. The multi-system physiological impairment and malfunction, inter-system reflex activity and its effects together with the inability of the patient to exhibit the expected clinical symptoms and physical signs of complications due to loss/impairment of sensation can be overwhelming to clinicians inexperienced in the management of these patients. Spontaneous Neurological Recovery (SNR) following TSCI was reported by Frankel et al in 1969 and repeatedly confirmed since then. This is provided that both the biomechanical instability of the injured spine and the Physiological Instability of the spinal cord are well managed and the medical complications are prevented. Clinical sparing of long tracts in the first few days of injury was first demonstrated by Frankel et at 1969 to be a good predictor of recovery irrespective of the severity of the fracture on X-rays. The correlation between the type of long tract spared and the degree of neuro-functional recovery was confirmed in the largest series of 612 patients treated and closely monitored under one roof and expressed in the Frankel classification which to date remains the most clinically meaningful classification. The development of CT & MRI resulted on increased emphasis on the management of the injured spine often on the expense of the management of the other effects of cord damage. This presentation will discuss the controversial issues around the management of patient and in particular the injured spine, the tools to evaluate the neurological outcomes. Also, it will demonstrate what determines the neurological outcome is the force of the impact on the cord at the time of injury and the quality of the comprehensive management of the patient and all the effects of cord damage to prevent complications and not the radiological manifestation of the injury.

Recent Publications:

1. Wagih El Masri, 5th April 2022 4(3)Traumatic Spinal Cord Injuries: Effects, Controversies in Management and Neurological Outcomes. DOI:10.31579/2694-0248/035 2.

2. W.S. El Masri, International Journal of Orthopedics and Rehabilitation, 2021, 8, 19-29 Spontaneous Neurological Recovery of Patients with Acute Traumatic Spinal Cord Injuries (ATSCI) without Intervention the Injured Cord DOI: https://doi.org/10.12974/2313-0954.2021.08.4.

Biography

W S El Masri is a Clinical professor of Spinal Injuries at Keele University. He is an Emeritus Consultant Surgeon in Spinal Injuries Robert Jones & Agnes Hunt Orthopaedic Hospital – Oswestry. He served as the Chairman of BASCIS, as the President of International Spinal Cord Society (ISCoS). He is a Trustee of the Institute of Orthopaedic R J A H Hospital, Oswestry. Also, he is the Founder Member and Chairman of Trustees SPIRIT Educational Charity in Spinal Injuries.

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Vibrotactile coordinated reset fingertip stimulation – treating Parkinson's with a vibrating glove

Abnormally strong neuronal synchronization is a hallmark of Parkinson's disease (PD). In medically refractory PD patients, standard deep brain stimulation (DBS) reduces specific symptoms during stimulus delivery. Coordinated Reset (CR)-DBS is a computationally developed technique which uses dedicated patterns of electrical stimuli to specifically counteract abnormal neuronal synchronization by desynchronization. The very goal of CR stimulation is to make neuronal populations unlearn abnormal synaptic connectivity patterns, in this way inducing long-lasting relief. Long-lasting therapeutic and desynchronizing CR-DBS effects were demonstrated in Parkinsonian (MPTP) monkeys and externalized PD patients. To provide a non-invasive alternative to DBS, we developed vibrotactile Coordinated Reset (vCR) fingertip stimulation. To this end, instead of administering electrical bursts through depth electrodes, we non-invasively deliver weak vibratory bursts in a CR mode to patients' fingertips. In a first-in-human study, vCR fingertip stimulation was administered to 5 idiopathic PD patients for in total 4 h per day on 3 consecutive days. Off-medication kinematic assessments revealed improved gait and bradykinesia during stimulation days and after 1 month after cessation of stimulation. In a pilot study, six idiopathic PD patients were treated with vCR stimulation delivered for in total 4 hours per day for 3 months. Patients' conditions were evaluated after medication withdrawal (off medication) by means of MDS-UPDRS III scores and EEG recordings before and after 3 months of vCR. vCR therapy caused a statistically and clinically significant reduction of PD symptoms off medication together with a significant reduction of high beta (21-30 Hz) power in the sensorimotor cortex (https://www.youtube.com/watch?v=dSjv6m4xLH0). Additionally, in a case series in 3 idiopathic PD patients, 6+ months of vCR therapy caused a significant motor improvement, where off-medication MDS-UPDRS III scores decreased linearly. The ultimate goal of vCR is to induce sustained symptom relief by non-invasively delivering weak vibratory stimulation patterns only regularly or occasionally.

Recent Publications:

1. A. Khaledi-Nasab, J.A. Kromer, P.A. Tass: Long-lasting desynchronization of plastic neuronal networks by double-random coordinated reset stimulation. Frontiers in Network Physiology 2:864859 (2022)

2. M. Madadi Asl, A.-H. Vahabie, A. Valizadeh, P.A. Tass: Spike-timing-dependent plasticity mediated by dopamine and its role in Parkinson's disease pathophysiology. Frontiers in Network Physiology 2:817524 (2022)

3. P.A. Tass: Vibrotactile Coordinated Reset Stimulation for the Treatment of Parkinson's Disease. Neural Regeneration Research. 17(7):1495-1497 (2021)

Biography

Peter A Tass studied medicine (MD, Ulm and Heidelberg Univ., Germany), physics (PhD, Stuttgart Univ., Germany), and mathematics (diploma, Stuttgart Univ.) and made a Habilitation in physiology (RWTH Aachen University, Germany). Since 2017 he is Professor of Neurosurgery in the Department of Neurosurgery, Stanford University Medical School, Stanford, CA, USA. Peter A. Tass investigates and develops neuromodulation techniques for understanding and treating neurologic conditions such as Parkinson's disease, epilepsy, dysfunction following stroke and tinnitus. He creates invasive and non-invasive therapeutic procedures by means of comprehensive computational neuroscience studies and advanced data analysis techniques. Peter A. Tass has published more than 160 peer-reviewed papers (h-index 55), is inventor or co-inventor on more than 270 patents and received a number of national and international awards. Stanford lab homepage: http://med.stanford.edu/tass-lab.html.

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