mode network (DMN) in the morning in RLS patients have been found. If these changes are pertinent to the disease expression then they should show a diurnal difference to maintain consistency in the clinical expression of the disease. The purpose of this study was to elucidate the potential neural mechanisms underlying the circadian aspect of RLS symptom expression by assessing for diurnal changes in DMN.

Methods: Fifteen drug-naïve subjects with idiopathic RLS and 15 age and gender-matched healthy subjects had fMRI scans in the morning and evening. The comparison of default mode network (DMN) between morning-evening within groups and between RLS and controls was conducted. We used MRI's (structural images, resting state functional images), Korean versions of International RLS scale (K-IRLS), and other sleep questionnaires.

Results: The mean age of the RLS patients and controls was 57.40 ± 10.34, and 58.13 ± 10.77 respectively. The K-IRLS was 26.40 ± 6.91 and the RLS duration was 124.07 ± 126.90 months. There were alternations in the DMN connectivity in RLS compared to the healthy controls in daytime and evening, which showed the disturbances and changes in the DMN. In particular, RLS showed sustained increased connectivity in the parietal lobule both in daytime and evening. In addition, they showed variations of connectivity in the thalamus, which were increased in the daytime and reduced in the evening. In addition, there were negative correlations between the thalamic connectivity and the Korean versions of the international RLS scale symptom severity subscore and the quality-of-life subscore.

Conclusion: The results indicated disturbances of the DMN in RLS subjects that influence the thalamic relay sensory associated circuit. This suggests RLS subjects may have deficits in controlling and managing sensory information supporting the hypothesis that RLS is a disorder of somatosensory processing.

Support (If Any):

0745

RESTLESS LEGS SYNDROME / WILLIS EKBOM DISEASE IN BARIATRIC SURGERY PATIENTS

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Introduction: Iron deficiency occurs in approximately 51% of patients following bariatric surgery. Iron deficiency is a risk factor for restless legs syndrome/Willis Ekbom Disease (RLS/WED); yet this disease has not been systematically studied in the bariatric surgery population. Our objectives were to prospectively analyze presence and severity level of RLS/WED in patients before and after undergoing bariatric surgery for weight loss.

Methods: Consecutive adult patients scheduled for bariatric surgery for treatment of obesity between October 2014 and February 2016 were enrolled. Subjects completed validated questionnaires to assess presence and severity of RLS/WED (Cambridge-Hopkins Questionnaire 13 and International Restless Legs Syndrome Study Group Rating Scale (IRLS)) during baseline and follow-up visits.

Results: In 101 total subjects, 79% were females. Mean body mass index was 45.65 (SD +/- 7.7). Baseline RLS/WED was present in 21% of patients with a mean IRLS score of 15 (SD +/- 9.0). Three months following surgery, an additional 17% of subjects who presented for followup had developed RLS/WED (8/47); at 6 months an additional 8.8% (3/34); and at 12 months an additional 27% (3/11) had developed RLS/WED. Pre-surgical hemoglobin was below 12.0 g/dL in 8% (7/91). At baseline, 32% (32/101) of subjects were on a proton pump inhibitor and 39% (40/101) were on an antidepressant. Sleep studies were performed in 50% of patients (50/101) and 84% were diagnosed with obstructive sleep apnea. Of the 37 subjects who underwent in-lab polysomnography, mean periodic limb movement index was 20.47/h (SD +/- 34.5).

Conclusion: Bariatric surgery patients may be at higher risk for RLS/WED than the general population and their disease may be unrecognized. Long-term follow-up to identify new or worsening cases will be important, particularly given high risk of iron deficiency in this population. Routine screening for RLS/WED should be considered in bariatric surgery patients.

Support (If Any):

0746

REVIEW OF A MULTISENSOR, LOW COST, AND UNOBTRUSIVE APPROACH TO DETECT MOVEMENTS IN SIT AND SLEEP

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Introduction: Movement measurements in the Suggested Immobilization Test (SIT) and sleep recordings are typically measured by polysomnography (PSG) with electromyography (EMG). We investigated the viability of an alternate home-based recording system, SleepSmart, which combines sensing technologies integrated in a bedsheet and 3D video to detect movements.

Methods: Pilot study: 19 participants were administered the SIT in the Biomechanics Lab; the subject lay on an angled bed for 30 minutes and slept for up to 90 minutes. We used a combination of the Kinect videography system enabling conventional 2D and novel 3D-technology, a portable EMG device, and a mattress topper sheet fitted with flexible sensors. EMG data was recorded for both tibialis anterior muscles. The goal was to perform pilot testing on the integrated system to fine tune the procedure and equipment.

Results: Main findings: The 3-D video recordings enabled the study of movement developments, a novel feature not captured by 2-D video-recordings and/or EMG. Pitfalls in the EMG setup, overall protocol design, and data synchronization were encountered. Several requirements were identified to optimize the test-setup: (1) A millisecond-level time stamping system was needed to sync data between multiple modalities; this mechanism will support identification of movement characteristics (development and peak) for Periodic Limb Movements (PLM). (2) Reflective or light-absorbing artifacts should be removed to maintain video data integrity. (3) With the demonstrated effectiveness of the video-data characterization feature, the mattress-sensor framework should implement machine learning algorithms to automatically identify movement events.

Conclusion: Based on findings, the mattress sensors are being replaced with newer sensors to improve performance. The switch from force-sensing resistors (FSRs) to accelerometers incorporates detection of physiological signals (heartbeat and breathing rate). Identification algorithms will include sleep apnea events. More pilot testing will be conducted to validate changes.

Support (If Any): Kids Brain Health Network (previously NeuroDevNet), AIT Austrian Institute of Technology, BC Children's Hospital Foundation.

0747

CRANIAL ELECTROTHERAPY FOR MILITARY BENEFICIARIES WITH RESTLESS LEG SYNDROME

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Introduction: Restless Legs Syndrome (RLS) causes uncomfortable dysesthesias, greatly influencing sleep quality and overall health. Since 2006, RLS rates in military beneficiaries have increased every year. Side effects of pharmacologic treatment options hamper operational readiness. Leading causation theories for RLS point to dopamine deficiency in the central nervous system. Cranial Electrical Stimulation (CES) is a non-invasive treatment affecting activity in dopaminergic regions of the brain. It does not interact with medications or contribute to polypharmacy. The purpose of this study was to determine the feasibility of CES treatment in military beneficiaries with RLS and gather preliminary data comparing differences in RLS symptom severity and quality of life.
Methods: Double-blind, placebo-controlled trial. Individuals were randomized to one of three groups: control, sham device, or active CES device. Measurements of RLS symptom severity, sleep, and quality of life were collected over 8 weeks and group differences over time were analyzed using linear mixed models.
Results: There were no significant group differences at baseline. Symptom severity decreased over time ($p = 0.091$), regardless of treatment group. Among those participants not already taking a dopamine agonist, there were clinically and statistically significant decreases in symptom severity in the CES group versus the control group after controlling for overall quality of life ($p = 0.02$). Adequate blinding was confirmed. Recruitment, particularly in females, was confounded by low ferritin levels (excluded per protocol). Though all groups initially improved, only the CES group demonstrated continued, progressive decreases in symptom severity over time suggesting longer treatment duration may be required. Pre-existing dopamine agonist therapy impacted responsiveness to treatment and should be analyzed more rigorously in future studies.
Conclusion: This study demonstrates preliminary support for CES as a non-pharmacological option for RLS, but additional evaluation is needed. Feasibility data from this study should be used in planning future research.
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0748

REDUCTION IN RESPONSE TO GABAPENTIN ENACARBIL IN RLS PATIENTS PREVIOUSLY TREATED WITH DOPAMINERGIC AGENTS: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY

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Introduction: Long-term treatment with dopaminergic agents (DAs) frequently leads to loss of response and augmentation. Both complications probably reflect a drug-induced change in the pathophysiology of RLS by which therapeutic response to DAs is reduced. The question is whether long-term DA treatment might also dampen the response to non-DA treatments.
Methods: We performed a randomized, double-blind, cross-over, placebo-controlled study on two groups of RLS patients: treatment-naive patients (group A) and non-augmented patients treated with dopaminergics for the last 5 consecutive years (group B). Following wash-out from any previous CNS-active drugs, patients were randomized into one of two groups for two consecutive two-week treatment periods with gabapentin enacarbil (GBPen) and placebo. Treatment was administered at 7PM at a fixed dose of 600 mg/day. RLS severity was measured weekly by means of the International Restles Legs Syndrome Scale (IRLS) and Clinical Global Improvement (CGI). Also, an M-SIT was performed between 6pm and midnight at the end of each treatment condition.
Results: There were no differences between groups in age, duration of disease, ferritin levels, or family history. In Group A, there was an improvement under gabapentin enacarbil compared to placebo at all endpoints (change in IRLS: -11.09 ± 4.68, $p<0.001$; CGI: -2.00 ± 1.08, $p<0.01$; MSIT: 18.00 ± 31.19, $p<0.1$). In contrast, patients in group B improved less (IRLS: -5.54 ± 4.84, $p<0.001$; CGI: -1.00 ± 1.08, $p<0.05$; MSIT: -3.38 ± 22.43, n.s.). Improvement was greater at all endpoints in Group A compared to Group B ($p<0.01$).
Conclusion: Our study shows that the response to alpha-2 delta ligands is reduced in patients previously treated over the long-term with DAs. Our finding has strong implications for the initial choice of treatment in RLS, and it supports the notion that initial treatment should not be started with DAs.
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