

conductance levels on the lower limb ($p=0.191$) and upper limb ($p=0.78$) between both SCS states.

Conclusions: Based on the results of this study, experimentally influencing SCS states does not seem to alter skin conductance levels. This leads to the hypothesis that SCS is not inducing an influence on the orthosympathetic nervous system.

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SELECTIVE MODULATION OF HUMAN WAKEFULNESS -SURGICAL TARGETING OF BRAINSTEM AROUSAL PATHWAYS

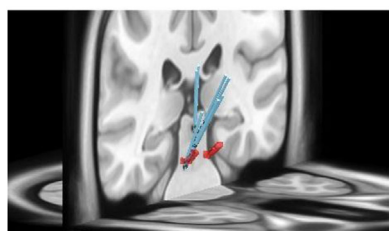
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Background: Disorders of Consciousness, such as minimally conscious state following traumatic brain injury, are extremely difficult to treat. Deep sleep shares electrophysiological markers (such as higher levels of slow wave activity) with decreased attentional and vigilance states, thus is an attractive study model. Existing patients with deep brain stimulation (DBS) devices allow investigating the ascending arousal system and novel stimulation paradigms that may effectively alter consciousness state. A pathway originating from the pedunculopontine nucleus of the brainstem (PPN) delivers activating cholinergic afferents, closely linked to wakefulness. This nucleus is also important in locomotion so has been surgically targeted for movement disorders.

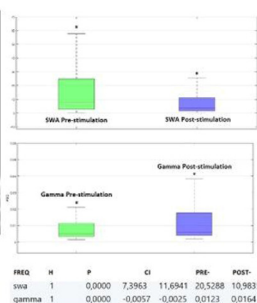
Methods: Four patients underwent bilateral electrode implantation in the PPN. After at least 72 hrs of recovery we applied a closed-loop bilateral stimulation protocol, targeting periods with electrophysiological markers of sleep fragility. We assessed its ability to entrain rhythms associated with arousal, decrease activity defining deep sleep and induce behavioural changes.

Results: We efficiently entrained fast cortical rhythms, decreased slow-wave activity and induced behavioural arousal. These results were highly statistically significant when delivered in a closed-loop manner, quadrupling gamma power ($p=0.0000$ pre:0.0094 post:0.0363) as measured on the EEG, reducing delta activity ($p=0.0098$ pre: 12.8335 post:9.4810) and shifting patients to lighter sleep or wakefulness.

Conclusion: In this human study, we demonstrated selective modulation of wakefulness through deep brain stimulation of the PPN. Our finding that specific parameters of stimulation can increase arousal states, paves a potential new pathway to the investigation of DBS in treatment-refractory hypersomnia and disorders of consciousness.



Closed-loop paradigm: effects on slow wave (0.5 to 2 Hz) and gamma activity (low and high range). Lead location in the PPN (mirrored leads, left)



9 ADULT CSF DISORDERS

9.1 Hydrocephalus

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ENDOSCOPIC THIRD VENTRICULOSTOMY COMPARED TO VENTRICULOPERITONEAL SHUNT AS A FIRST LINE TREATMENT FOR LONG STANDING OVERT VENTRICULOMEGALY IN ADULTS (LOVA): WHICH TREATMENT SHOULD BE OFFERED?

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Background: Long standing overt ventriculomegaly in adults (LOVA) is part of a heterogeneous group of conditions with differing presentations. Few studies have evaluated success rates after surgical treatment, and there is a need to assess the efficacy of both endoscopic third ventriculostomy (ETV) and ventriculoperitoneal shunt (VP) as first line treatments in large cohorts.

Methods: Retrospective study of all adults (>18 yrs) diagnosed with LOVA in the absence of identifiable cause between 2007 and 2019 at a tertiary Neurosurgery centre in England, UK. Presentation, radiological features, management strategy and outcome were examined.

Results: 88 Patients were included. The mean age at diagnosis was 49.6 years (range 21-81). 52.3% were male ($n=46/88$). Most patients were symptomatic (62.5%, $n=55/88$), and the median symptom duration was 12 months (IQR 5-28 months). The most common symptoms were gait ataxia, headache, and cognitive decline (51.1%, 39.8%, and 30.7% respectively). Six patients had papilloedema on examination. 52 patients underwent surgery (48 immediately, 4 after ICP monitoring; 45 ETV, 7 VP shunt).

The median follow-up period was 30.2 months (IQR 13.9-60.0). Of those with follow up at 1 year, 84.1% had a clinical improvement after surgery, and 77.8% a radiological improvement. Clinical improvement rates were similar between ETV and VP Shunt groups (84.2% vs 83.3%, $p=0.956$). Surgical complication rates were significantly lower in the ETV group compared to the VP shunt group (4.5% vs 42.9%, $p=0.015$).

ETV was successful according to definitions by Oi, Jenkinson, and Ibáñez-Botella in 84.2%, 76.3%, and 76.3% of patients respectively. 14 patients (29.8%) underwent further surgery, with eight patients improving.

Conclusion: ETV and VP shunt showed similar success rates. This large study demonstrates efficacy for ETV as a first line treatment for symptomatic LOVA, with a lower complication rate than VP shunt.

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ROLE OF DESH, CALLOSAL ANGLE AND CINGULATE SULCUS SIGN IN PREDICTION OF GAIT RESPONSIVENESS AFTER SHUNTING IN INPH PATIENTS

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Background: Primary endpoint of this single-centre, prospective consecutive cohort study was to evaluate DESH score, CA, CSS and Evans index of suspected iNPH patients against the reference standard of lumbar infusion test (LIT) and external lumbar drainage (ELD) in prediction of gait response after VP shunt implantation in patients with idiopathic normal pressure hydrocephalus (iNPH). **Methods:** Patients were assigned to NPH and non-NPH groups based on LIT and ELD results. VP shunt surgery was indicated in patients with resistance to CSF outflow (Rout) ≥ 9 mmHg/ml/min with 1.5 ml/min constant infusion rate during LIT and after at least 15% improvement in the Dutch Gait Scale after 120 hours of lumbar drainage. Age-matched controls were added for group comparison. 32 NPH, 46 non-NPH and 15 control subjects were enrolled in the study.

Results: There were significant differences in mean preoperative DESH scores of NPH, non-NPH and control groups (6.3 ± 2.3 [\pm SD]) (range 2-10) vs 4.5 ± 2.4 (range 0-10) vs 1.0 ± 1.2 (range 0-4). Differences in mean CA and Evans index were not significant between NPH and non-NPH groups. CSS showed 62.5% sensitivity, 60.87% specificity, 52.63% PPV and 70% NPV for differentiation of