Table 1: Summary of included studies

| Author (Date) | Morito et al (2011) | Wilson et al (2013) | Ferioli et al (2014) | Ikeda et al (2014) | Krezlin et al (2014) | Ramey et al (2017) | Ahmed et al (2018) | Tahir et al (2018) | Lai et al (2019) |
|---|---|---|---|---|---|---|---|---|---|
| Number of patients | 1 (CR) | 36 | 1 (CR) | 23 | 12 | 5 | 118 | 59 | 37 |
| Number Surgery/Total | 1 (100%) | 5 (14%) | 1 (100%) | 7 (30%) | 12 (100%) | 2 (40%) | 5 (5.7%) | 6 (10%) | 10 (27%) |
| **Type of Intracranial hemorrhage** | | | | | | | | | |
| Supratentorial | 1 Aneurism | 5 | 0 | 4 | 9 | 1 | NR | 1 | 6 |
| Infratentorial | 0 | 0 | 0 | 0 | 3 | 0 | NR | 0 | 0 |
| Subdural | 0 | 0 | 0 | 3 | 0 | 1 | NR | 4 | 0 |
| Subarachnoid | 1 | 0 | 1 | 0 | 0 | 1 | NR | 0 | 4 |
| Intraventricular | 0 | 0 | 0 | 0 | 0 | 1 | NR | 0 | 0 |
| Extradural hematoma | 1 | 0 | 0 | 0 | 0 | 0 | NR | 0 | 0 |
| **Type of surgery performed** | | | | | | | | | |
| Craniotomy | 1 | 2 | 0 | 2 | 11 | 2 | 2 | 1 | NR |
| Craniectomy | 0 | 3 | 0 | 4 | 1 | 0 | 3 | 0 | NR |
| Burr hole | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | NR |
| EVD | 0 | 0 | 1 | (2) * | 0 | 2 | 2 | 1 | NR |
| Recurrent bleeding (%) | 0 % | 0 | 0 | 28% | 75% | 100% | 20% | NR | NR |
| **Initial, preoperative, & postoperative anticoagulation** | | | | | | | | | |
| Initial INR mean or range | 3.85 | NR | 1.5 | 2.94±1.28 | 2,7±1,6 | 1.4 - 4 | NR | 2.8 (1.2-6.9) | NR |
| INR before surgery | NR | NR | 1.5 | <1.3 | ≤1,2 | <1.4 | NR | NR | NR |
| Post-operative timing/ set goal anticoagulation | NR | NR | 7 days/ NR | NR | PTT 60 s – heparin 8/12 (4 died <24 h) | NR | NR | NR | NR |
| Thromboembolic events | 0 | 0 | 0 | 0 | 0 | 1 (AD) | NR | 0 | NR |
| **Outcome** | | | | | | | | | |
| Death within 30 days - n/N (%) | 0 | 4/5 (80%) | 0 | 6/7 (86%) | 9 (75% - 4 in < 24h) | 2/2 (100%) | NR | 4/6 (67%) | NR |
| Outcome | Hemiplegia but good outcome | NR for 1 patient | Complete recovery | SDH - discharge | mRS 5: 2/12 mRS 4: 1/12 | mRS 2: 1 – died later mRS 3: 1 – died later | NR | 2 subdural survived - NR | NR |

**Abbreviations**: EVD – external ventricular device, INR - international normalized ratio, PTT – partial thromboplastin time, mRS – Modified Rankin Scale, NR – not reported, CR – case report, AD – after discharge *2 of the 7 patients also received EVD placement

**Conclusion:** Early surgical treatment with craniectomy in large IPH that present a midline shift and large volumes may be lifesaving. Medical anticoagulation may be withheld from patients with LVAD treatment for a certain period without thromboembolic events. A possible bridge to re-initiation of warfarin in patients presenting with HIT or heparin resistance may be achieved with argatroban infusion with set aPTT levels of 1.5 to 2 times initial values according to our experience. The current literature is lacking regarding effective surgical and medical management and further research is of great necessity.

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## 000869

### Prediction for the need of tracheostomy in patients with large vessel occlusion stroke beeing treated with meachanical thrombectomy

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**Introduction:** Patients with large vessel occlusion stroke (LVOS) eligible for mechanical thrombectomy (MT) are at risk for stroke- and non-stroke related complications resulting in the need for tracheostomy (1). Evidence suggest that early tracheostomy might exhibit distinct advantages over continued orotracheal intubation, ventilation and sedation (2).

**Objectives:** To investigate clinical-, periinterventional- and imaging factors to predict the need for tracheostomy in major stroke patients undergoing MT.

**Methods:** Prospectively derived data from patients with LVOS and MT being treated in a large, academic neuro-ICU between 2014 and 2018 were analyzed in this monocentric study. Predictive value of peri- and postinterventional factors, stroke imaging and pre-stroke medical history were investigated for their potential to predict tracheostomy during ICU-stay using logistic regression models.

**Results:** From 635 LVOS-patients treated with MT, 40 (6.3%) underwent tracheostomy during their neuro-ICU stay. Patients receiving tracheostomy were younger (71 (62-75) vs. 77 (66-83), p<0.001), had a higher National Institute of Health Stroke Scale (NIHSS) at baseline (18 (15-20) vs. 15 (10-19), p=0.009) as well as higher rates of hospital acquired pneumonia (HAP) (39 (97.5%) vs 224 (37.6%), p<0.001), failedextubation (15 (37.5%) vs 19 (3.2%), p<0.001), sepsis (11 (27.5%) vs. 16 (2.7%), p<0.001), symptomatic intracerebral hemorrhage (sICH) (5 (12.5%) vs. 22 (3.9%), p=0.026) and decompressive hemicraniectomy (DH) (19 (51.4%) vs. 21 (3.8%), p<0.001). In multivariate logistic regression analysis, HAP (OR 21.1 (CI, 2.7-163.3), p<0.003), Sepsis (OR 5.6 (1.8-18), p=0.003), failed extubation (OR 8.9 (3.2-24.5), p<0.001) and DH (OR 9.1 (3.5-23.3), p<0.001) remained as strongest predictors for tracheostomy. Patients with later timepoint of tracheostomy had longer ICU length of stay (r=0.384, p=0.030). There was no association between time to tracheostomy and clinical outcome (NIHSS at discharge: r=0.125, p=0.461; mRS at 90 days: r=-0.179, p=0.403).

**Conclusion:** Patients with LVOS undergoing MT are at high risk to require tracheostomy if extubation after the intervention fails, DH is needed and severe infectious complications occur in the acute phase after ischemic stroke. These factors are likely to be useful for the indication and timing of tracheostomy to reduce overall sedation and shorten ICU length of stay.

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3. Not applicable


## 000878

### Spectral p roperties of the EEG during recovery of consciousness after acute brain injury

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**Introduction:** EEG slowing (a relative increase of slow frequency and decrease of high-frequency power) is a common feature associated with loss of consciousness. We previously described how the EEG power spectrum slope (1/f decay) is steeper when consciousness is lost (e.g. during propofol and xenon anesthesia) and flatter when consciousness is preserved despite similar behavioral unresponsiveness (e.g. during ketamine anesthesia). The *Spectral Exponent* β describes how steep is the decay of the power spectral density over frequencies

(PSD=f-β, i.e. the EEG slowing)1. Similarly to both sleep and pharmacologically induced conditions, coma due to acute brain injury is typically associated with EEG slowing, whereas exit from a coma is associated with a recovery of fast frequencies and low amplitude EEG activity typical of normal wakefulness.

**Objectives:** We tested the hypothesis that the recovery of consciousness after acute brain injury is paralleled by a progressive flattening of the PSD decay.

**Methods:** We collected 107 longitudinal EEG at different days from injury from 22 patients (mean 4,6 EEG for each patient, IQR 3 – 6) with acute brain injury with transient loss of consciousness and good recovery (functional communication at discherge). Patients are divided into two subgroups based on etiology: post anoxic groups (n=14) and generic acute brain injuries (different etiologies but post anoxic, n=8). Recordings with any anesthetics or status epilepticus were excluded. We obtained the *Spectral Exponent* (SE) for each EEG. We then estimated if the modifications of the β values were linearly predictable by two variables: time form injury and a clinical feature expressed by the Glasgow Coma Scale (GCS). A mixed-model effect was used to estimate whether the variation of β was dependent across subjects to either time post injury or the GCS, beyond the effects observable within each subject.

**Results:** For both groups we found a significant effect of the two independents variables on the *Spectral Exponent* β: β decreases significantly as a function of the time after injury ($p<0.005$ for both groups) and as a function of GCS ($p<0.0001$ for both groups).

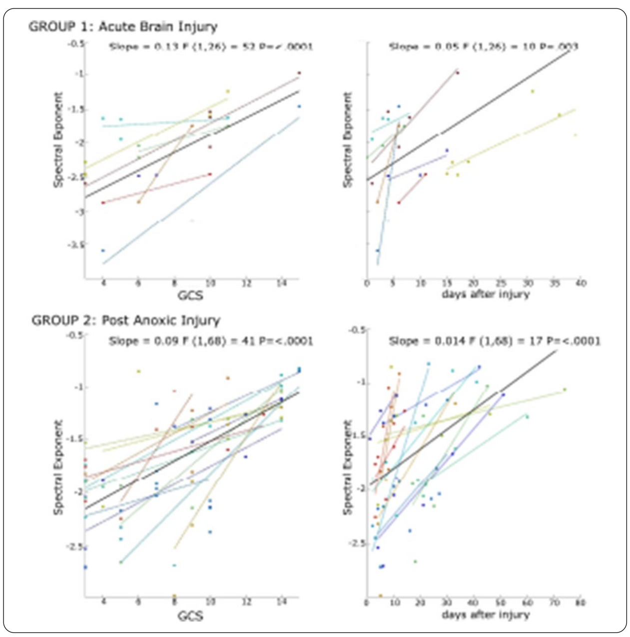


Figure: each coloured dot represents the value of the spectral exponent colour-coded for patients who recovered from coma (acute brain injury, Group 1; post anoxic, group 2). Regression lines are represented with colour coding for patients. Bold black line represents the mixed model effects: slope, F Fischer and p value are reported for the two variables of each group.

**Conclusion:** Together with the traditional clinical evaluation, the *Spectral Exponent* β seems to be a reliable measure for tracking brain state transitions leading to the recovery of consciousness after acute brain injury. The theoretical background about the genesis of the slow rhythms in disorders of consciousness provides a framework for the clinical use of the spontaneous EEG in objectively monitoring brain states behind clinical signs. The *Spectral Exponent* may help clinicians to identify the underlying brain processes that steer from slow rhythms to a recovery of more balanced EEG activity patterns able to support consciousness.

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## 000937

### The prognostic role of lactate concentrations after aneurysmal subarachnoid hemorrhage

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**Introduction:** The value of serial lactate measurements in patients after SAH has not been well studied. The aim of this study was to assess the prognostic role of serial lactate measurements on survival and neurological outcomes in aneurysmal subarachnoid hemorrhage (aSAH) patients.

**Methods:** We reviewed data of all patients admitted to our Department with the diagnosis of aSAH from January 01, 2007 to March 31, 2019. Arterial blood lactate levels were routinely obtained at least once a day. We collected the highest lactate level daily during the first 5 days. We reported hospital mortality and 3-month unfavorable neurological outcome (UO) defined as a Glasgow Outcome Scale of 1-3.

**Results:** Of a total of 456 patients, 64% were female, with a median age of 54 [46-63] years. Hospital mortality occurred in 158 (35%) patients and UO in 209 (46%) patients. The highest lactate level was on admission (2.1 [1.2-3.4] mmol/L) and then progressively decreased until day 5. Patients with UO had significantly higherlactate levels over time than the other patients, in particular on the day of admission (2.9 [1.9-4.1] vs. 1.5 [0.9-2.6] mmol/L; $p<0.01$). In a multivariable analysis, lactate levels measured on admission were significantly associated with UO (OR 1.25 [CI95% 1.0-1.6]; $p=0.049$).

**Conclusion:** Initial lactate levels have prognostic implications in SAH patients; their value in conjunction with other variables should be evaluated in larger cohorts.

## 000984

### Super Refractory Status Epilepticus in children and adolescents

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**Introduction:** Refractory and super-refractory status epilepticus (SE) in children are associated with high morbidity and mortality. Refractory SE (RSE) is defined as persistent seizures that fail to respond to antiepileptics and is only controlled with continuous infusions of anesthetic solutions, while super-refractory SE (SRSE) persists after induction of anaesthetics or leads to rebounds after withdrawal of anaesthesia (1,2). Thorough imaging, metabolic, immunological and genetic investigations are often necessary to identify the cause.

**Objectives:** The present study aims to describe characteristics of status epilepticus in children and adolescents, focusing on RSE and SRSE.

**Methods:** This is a retrospective, single-centre study of SE, RSE, and SRSE cases treated in the pediatric ICU of the University Hospital of Heraklion from 2009 to 2019.

**Results:** A total of 93 hospitalisations for SE, concerning 86 patients (50% females), were included in the study. The median age of the