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P144
Post traumatic cerebral thrombophlebitis: prospective study about 15 cases

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Introduction Head injury is a rare but possible etiology of cerebral thrombophlebitis. The diagnosis should be considered especially in front of open head injuries extended to venous sinuses. The MR angiography is the gold standard for early diagnosis.
Patients and methods This is a descriptive prospective study of all trauma patients hospitalized in the intensive care unit of the University Hospital Habib Bourguiba Sfax over a period of 6 years between January 2010 and June 2016 and in whom the diagnosis of cerebral venous thrombophlebitis has been confirmed by angiography CT or MR angiography.
Results During the period study, 15 patients were included. The median age of patients was 29 [17–49] years. All patients were male, victims of poly trauma following an accident of traffic. In admission, SAPSII was 31 [24–52] and SOFA was 4 [2–8]. We have noted the presence of a serious head injury in 15 patients, extended open skull fractures of the venous sinus in 9 patients. A related chest trauma was present in 12 patients and abdominal trauma in 4 patients, trauma of the pelvis and/or members were present in 7 patients. All patients underwent mechanical ventilation. The diagnosis of cerebral venous thrombosis was confirmed by cerebral angiography CT in 9 patients and cerebral MR angiography in 6 patients. 7 patients have presented secondary pulmonary embolism. All patients did not show a contraindication against anticoagulation at diagnosis of thrombophlebitis. The thrombophilia (antithrombin III, protein C and S, homocysteine, and antiphospholipid, gene mutation factors II and V) as well as for antineutrophil cytoplasmic antibodies were negative in all patients. The outcome was favorable in 13 patients. Two patients were died due to a state of refractory septic shock.
Discussion Post traumatic cerebral thrombophlebitis is a rare thrombotic vascular disease. It must be mentioned especially with presence of extensive skull fractures in open sinuses. Venous MR angiography is the gold standard. The treatment is based on anticoagulation curative dose. Its prescription can be complicated in these cases associated with traumatic intracranial hemorrhage.
Conclusion Head injury is a rare but possible etiology of cerebral thrombophlebitis. Other prospective studies are needed to better understand the path physiology and the prognosis of these thromboses.

Competing interests
None.

P145
Pain measurement in mechanically ventilated patients with traumatic brain injury: behavioral pain tools versus analgesia/nociception index—preliminary results

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Introduction Pain is highly prevalent in critically ill trauma patients especially those with a traumatic brain injury (TBI). Behavioral pain tools such as the Behavioral pain scale (BPS), and critical care pain observation tool (CPOT) are recommended for sedated non-communicative patients. The analgesia nociception index (ANI) assesses the relative parasympathetic tone as a surrogate for antinociception/nociception balance in sedated patients. The primary aim is to evaluate the effectiveness of ANI in detecting pain in TBI patients. The secondary aim was to evaluate the impact of Norepinephrine use on ANI effectiveness, and to determine the correlation between ANI and BPS.
Patients and methods We performed a prospective observational study in 21 deeply sedated TBI patients. Exclusion criteria were non-sinus cardiac rhythm; presence of pacemaker; atropine or isoprenaline treatment; neuromuscular blocking agents and major cognitive impairment. HR, blood pressure and ANI were continuously recorded using the Physiodoloris® device at rest (T1), during (T2) and after the end (T3) of the painful stimulus (tracheal suctioning).
Results In total, 100 observations were scored. Patients' *characteristics* were *resumed* in Fig. 1. ANI was significantly lower at T2 (Med (min–max) 54.5 (22–100)) compared with T1 (90.5 (50–100), $p < 0.0001$) and T3 (82 (36–100), $p < 0.0001$). Similar results were found in the subgroups of patients with (65 measurements) or without (35) Norepinephrine. During procedure, A negative linear relationship was observed between ANI and BPS ($r^2 = -0.469$, $p < 0.001$). At the threshold of 50, the sensitivity and specificity of ANI to detect patients with BPS ≥ 5 were 73 and 62%, respectively with a negative predictive value of 86%.
Discussion
Conclusion ANI is effective in detecting pain in deeply sedated critically ill TBI patients, including those patients treated with Norepinephrine.

Competing interests
None.

The aim of the study was to evaluate efficacy of NIV in AE/OHS and to identify factors associated with poor prognosis in non-invasive-ventilated AE/OHS patients.

Patients and methods A retrospective analysis of all consecutive patients admitted to ICU for AE/OHS. Clinical, ABG's and outcome characteristics were collected. Factors associated with poor prognosis were identified.

Results One hundred patients were included over a 13 years period. 44 patients underwent NIV. They were 66.6 ± 12.6 years aged; BMI, 40.6 ± 7.7 kg/m^2; SAPSII, 29 ± 13; pH, 7.33 ± 0.08; pCO_2, 69 ± 22 mmHg. They were scored with grade II encephalopathy score on admission. Mean duration of NIV was 5.1 ± 4.4 days. 14 (32%) patients failed NIV and were intubated with a delay of 85.6 ± 156.7 h. 11 (25%) died and length of stay was 10.7 ± 9.5 days. Four factors were significantly associated with mortality, mMRC, (47 vs 14%; p = 0.02); encephalopathy score, (60 vs 15%; p = 0.008); NIV failure, (64 vs 7%; p = 0.0001); inotropic agents, (58 vs 12.5%; p = 0.004).

Conclusion NIV in AE/OHS demonstrates rather efficient. However delay of intubation seems to be of poor prognostic value.

Competing interests
None.

P193

Oxygenotherapy with an oxygen concentrator in intensive care unit: a prospective study

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Introduction Oxygen therapy is an essential issue for the French Military Health Service (FMHS). Wounded soldiers are severe trauma patients often burnt and suffering from haemorrhagic shock. They need all along their management oxygen therapy. The theatres of external operations are isolated with limited resources. Their supply is difficult. Currently, 50% of the trauma are intubated. Thirty-three percent of the patient admitted in intensive care suffers from acute respiratory distress syndrome (ARDS). The FMHS chose oxygen concentrator as oxygen source in addition to oxygen pressurized bottles. Their supply can be uncertain in conflict areas. Insufficient data are available concerning the use of oxygen concentrator in intensive care unit.

The primary endpoint was to determine over the total duration of oxygen therapy, the number of days on which the use of pressurized oxygen was needed for patients oxygenated by oxygen concentrator. The secondary endpoints were to identify when pressurized oxygen was needed, describe the characteristics of the population with oxygen therapy and estimate the oxygen quantity economised thanks to the use of oxygen concentrator.

Materials and methods The study took place in the forward surgical unit of Bouffard. It's a French role 3 located in Djibouti Republic in Africa. All patients over 15 admitted in the intensive care and needing oxygen therapy were included. All the patients were oxygenated with an oxygen concentrator. The oxygen concentrators used were Sequaltm Integra 10 OM, that could deliver up to 10 l/min of normobaric oxygen. The ventilator used were Pulmonetictm LTV 1000 and 1200.

Results Thirty-six patients were included over the 6 months' study period. Sixty percent of the patients were men with an average age of 38 (15–90). Sixty percent of them were medical admissions, 22.9% were trauma and 17.1% were surgical admissions. Eight persons died which represented 22.9% of the patients. The mean SAPS II was 38.8. The mean length of stay in intensive care was 9 days (0–44). The mean time of mechanical ventilation was 6 (1–35) days. Among the patients, 76.5% were intubated. Eight patients (22.8%) needed noninvasive ventilation, for six (17%) of them it was after extubation. Two hundred and fifty-one days represents the total number of days of oxygen therapy divided into 142 days of invasive ventilation, 15 days of noninvasive ventilation and 94 days of oxygen mask. The use of pressurized oxygen was necessary 19 times over the 251 days of oxygen therapy which represents 7.5% of the total time. The causes of its use were in ten cases (52.6%) criteria of severe ARDS, in six cases an emergency intubation and in three cases a transfer. One dysfunction of an oxygen concentrator happened during our study. The oxygen concentrator produced 1024 m3 of oxygen over the study period, which represents 104 oxygen pressurized bottles of 50 litres. This enabled an economy of 10,000 euros.

Conclusion It is safe to use oxygen concentrator to take care of critically ill patients in limited resources environment. The use of pressurized oxygen is still compulsory in two situations: in case of electricity failure and in case of high FiO_2 (above 60%). Oxygen concentrators are sufficient in 92.5% of the time. They enable to deliver oxygen any time which is essential when supply is uncertain in conflict areas.

Competing interests
None.

P194

Evaluation of fractional delivered oxygen between nasal cannula and nasal oxygen catheter

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Introduction Oxygen therapy is the main supportive treatment of hypoxia. Nasal cannula (NC) and nasal oxygen catheter (NOC) were used to administer oxygen therapy in hypoxia. Few studies have examined the difference in fractional delivered oxygen (FDO2) between these two systems. The aim of our study was to compare the difference of FDO2between NC and NOC.

Materials and methods On a bench study, a two-compartment model of adult lung (Dual Test Lung DTL, Michigan Instrument) was connected to a Servo i® Ventilator. The ventilator was set in volume-controlled mode. Three minute ventilation (MV: 6/9/12 l/min at Ti/Ttot = 0.33) and two oxygen flow rate (OFR: 2 and 4 l/min) were analyzed. OFR was analyzed with a thermal mass flow meter Vogtlyn™ Red Y. The compliance of the artificial lung was set to 70 ml/cmH_2O and the resistance set to 5 cmH_2O/l s^{-1}. The FDO2 and MV measurements were made using an iWorx® acquisition system (GA207gas analyzer and analog/digital IX/228 s) and LabScribe II® software. To simulate the anatomic dead space of the nasopharynx (±50 ml for an adult) we have used a 15 cm length corrugated tubing ISO 22 mm (CT22) at the level of inflow of DTL. NC was introduced at the entry of the CT22 while the NOC was introduced totally into the CT22. Statistical: ANOVA on ranks followed by Student–Newman–Keuls.

Results

Conclusion In oxygen therapy, with NC or NOC, for a Ti/Ttot = 0.33, FDO2 is influenced by MV, OFR and oxygen system delivery. For the same level of OFR and system delivery, when MV increases, FDO2 decreases (see Table 4). For the same MV and level of OFR, FDO2 was

Table 4 FDO2 comparison between NC and NOC at different OFR and MV

VE(L/min)	NC2 L/min	NOC2 L/min	NC 4 L/min	NOC4 L/min
6	31% (0.5)	37% (0.5)	38% (0.6)	43% (0.5)
9	29% (0.7)	34% (0.6)	34% (0.5)	39% (0.7)
12	26% (0.6)	30% (0.6)	30% (0.7)	34% (0.5)

ANOVA on ranks: p < 0.05, except between: NOC2 (VE 9 L/min) and NOC4 (VE12 L/min)/NC2 (VE 9 L/min) and NOC2 (VE12 L/min)/NOC2 (VE12 L/min) and NC4 (VE12 L/min)/NC4 (VE 9 L/min) and NOC4 (VE 9 L/min)/NOC2 (VE 9 L/min) and NC4 (VE 9 L/min)

more efficient with NOC than NC. The differences of FDO2 between NOC and NC decrease with increasing MV. The FDO2 fluctuations according to the value of the MV are greater with the NOC to 4 L/min.
In clinical situation, NOC is less used than the NC. Compared to the NC, NOC is an alternative to increase the FDO2 with the same OFR. NOC is more efficient than NC because during expiratory time, anatomical dead space it fills with O_2, which increases the FDO2. However, if the respiratory frequency increases then expiratory time decreases, filling with O_2 decreases which reduces FDO2. Note that NOC may become uncomfortable at OFR greater than 5 L/min.

Competing interests
None.

Reference
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P195
Variability of fractional delivered oxygen (FDO2) with nasal cannula
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Introduction Nasal Cannula (NC) is an option to deliver oxygen therapy. According to American Thoracic Society (ATS), standard NC delivers a fractional delivered oxygen (FDO2) of 24–40% at supply oxygen flows ranging from 1 to 5 L/min. An equation was proposed by ATS to predict oxygen delivery: FDO2 = 20% + (4 * O2 L/min). Moreover, for ATS, FDO2 is also influenced by respiratory frequency (Rf), tidal volume (Vt) and ratio Ti/Ttot. However, the equation of ATS does not take into account these parameters. Our hypothesis is that these parameters can significantly affect the FDO2. The aim of this study was to determine the effect of Rf, Vt and Ti/Ttot on FDO2.
Materials and methods The study was conducted on bench with NC connected to a two compartment adult lung model (Dual Test Lung®) (DTL) controlled by a Maquet Servo I® ventilator. One oxygen flow rate (OFR) (5 L/min) and 3 min ventilation (MV: 6/9/12 L/min) with two Ti/Ttot (0.33 and 0.25) were investigated. All settings of MV were generated by modifying Rf (10–40 CPM) and Vt (0.3 and 0.6 L). Inspiratory flows rate (IFR) obtained with settings range from 18 to 48 L/min. OFR was analyzed by a thermal mass flow meter Vogtlyn™ Red Y. FDO2 and MV measurements were made using a iWorx® acquisition system (GA207 gas analyzer) and LabScribe II® software. Compliance of DTL was set to: 0.07 L/cmH_2O and resistance to: 5 cmH_2O/L s^{-1}. Statistical: ANOVA repeated measures followed by Newman Keuls method.
Results FDO2comparisons between: Ti/Ttot 0.33 and 0.25 and three MV: 6–9–12 L/min at OFR: 5 L/min.
Conclusion IFR and OFR are the main determinants of FDO2. Equation of ATS is correct when IFR is equal to 18 L/min.
When IFR is different of this value, Equation of ATS is not appropriate.
In our experiment, with an OFR of 5L/min, when IFR = 18 L/min (MV = 6 L/min and Ti/Ttot = 0.33), the FDO2 is equal to 41% (±1%) (see Table 5). To this value of IFR, the FDO2 is in accordance with the formula of ATS, but when IFR increase beyond 18 L/min, the FDO2 decrease and the formula is not in accordance with ATS. This can be explain because during inspiratory phase, air room (Fractional oxygen = 0.21) entry in airway mixes with OFR (FO2 = 1), which modifies the FDO2. In this case, when IFR increase then FDO2 decrease and vice versa. Medical and paramedical staff must be aware that with patients who receive OFR by nasal cannula, any change of OFR and/or inspiratory flow changes the FDO2. In this case, for maintain the same FDO2, it is necessary that modify the value of OFR.

Competing interests
None.

Reference
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Table 5 FDO2 comparisons between diffferent TI/Ttot and MV at OFR 5 L/min

MV (L/min)	Ti/Ttot = 0.33				Ti/Ttot = 0.25			
	RfxVt	FDO2	RfxVt	FDO2	RfxVt	FDO2	RfxVt	FDO2
6	10 × 0.6	41% (a)	20 × 0.3	42% (d)	10 × 0.6	36% (g)	20 × 0.3	37% (j)
9	15 × 0.6	36% (b)	30 × 0.3	35% (e)	15 × 0.6	32% (h)	30 × 0.3	32% (k)
12	20 × 0.6	31% (c)	40 × 0.3	30% (f)	20 × 0.6	30% (i)	40 × 0.3	29% (l)

Rf respiratory frequency (in CPM), *Vt* tidal volume (in Liter)

ANOVA RM results: $p < 0.05$. No statistical difference are found between: (a–d)/(b–e)/(c–f)/(g–j)/(h–k)/(i–l)/(b–j)/(b–g)/(f–k)/(c–k)/(f–h)/(f–l)/(f–i)/(c–i)/(c–l)/(e–g)

P196
How to assess FiO_2 delivered under oxygen mask in clinical practice?
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Introduction The actual FiO_2delivered under oxygen mask in patients with acute respiratory failure and the factors that may influence the FiO_2 are poorly known. In clinical practice, different methods including formula or conversion tables based on oxygen flow can be used to estimate delivered FiO_2. We aimed to assess first the factors influencing measured values of FiO_2, and second the best method to estimate FiO_2 in patients breathing under oxygen mask.
Patients and methods We included ICU patients admitted for acute hypoxemic respiratory failure from a previous prospective trial [1] in whom FiO_2 was measured under oxygen mask using a portable oxygen analyzer. We collected demographic variables and respiratory parameters that may influence measured FiO_2. Low FiO_2 was defined according to the median measured FiO_2.
For each patient, measured FiO_2 was compared to "Calc + 3%" formula (FiO_2 = oxygen flow in liters per minute × 0.03 + 0.21) to "Calc + 4%" formula (FiO_2 = oxygen flow in liters per minute × 0.04 + 0.21), and to a conversion table [2]. A ± 10% limit of agreement for each estimation method was arbitrarily considered acceptable.
Results Among the 265 patients included, median measured FiO_2 was 65% [60–73]. After adjustment on oxygen flow, the three variables independently associated with low measured FiO_2 using multivariate analysis were patient's height, a low $PaCO_2$, and a respiratory rate greater than 30 breaths/min.
Using paired analysis, each estimation methods differed significantly from measured FiO_2 ($p < 0.0001$ for each). Values outside the limits

Conclusion Early mobilization during the first week of the sepsis onset was safe and preserved muscle fibre cross sectional area.

Competing interests
None.

Reference

1. Kress JP, Jesse BH. ICU-Acquired weakness and recovery from critical illness. N Engl J Med. 2014;(370):1626–35.

O82

Where should we place the stethoscope's chestpiece to hear the noise of the primary bronchi?

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Introduction The pulmonary auscultation is used by respiratory therapist (RT) to evaluate the efficiency of a treatment. Listen to the noises coming from the primary bronchi (PB) is important because it is the place where secretions can be accumulated. Therefore, it is crucial to know exactly where to place the stethoscope's chestpiece on the chest. Few studies have analyzed the chest area where the PB were located. Our hypothesis is that PB are localized on a line that joins axillary fossa (Bi-Axillary line: BAL). The aim of our study is to evaluate the probability to find the primary bronchi by analysis of chest radiography.
Patients and methods A retrospective study was performed by analysis of chest X-Ray using the software: TM reception®, which allows precise measures to the tenth of millimeter. All the X-Rays were made on confined to bed patients hospitalized within intensive care unit, internal medicine and abdominal surgery rooms.
The following measures (in mm) were made between:

a) Lowered perpendicular (LP) of:
    - Bi-Axillary Line (BAL) and the sternal carina (SC)
    - BAL's and the position of right and left PB
    - Middle of the body-sternum (BS) and the perpendicular middle of right and left PB.
b) Hyoid bone and the SC

The exclusion criteria were: BMI < 18.5 kg/m^2 and BMI > 30 kg/m^2, scoliosis, minor patient, lack of visibility of one of the axillary fossa, lack of visibility of PB, clavicular asymmetry, kyphosis, lack of symmetry in the shot, atelectasis and pneumothorax.
Statistics: Normality test: KS. Mean values are expressed with their SD and 95% CI.
Results
Discussion In this study, we performed analysis of chest x-Rays of bedridden patients and we demonstrated that it is possible to localize easily, on either side of the BS, the right and left PB at ± 25 mm distance (LP) above a line joining axillary fossa. This study constitutes a new tool for the RT who, by using stethoscope with a chestpiece of 10 cm^2 surface area, will be able to listen to noise coming from PB.
Conclusion The data presented herein (Fig. 31) show that right and left PB are located at a mean distance of 25 (±5) mm and 27 (±6) mm above the BAL, on both sides of the BS. The BAL represents thus an easy and precise mode to detect right and left PB by bedridden.

		Primary bronchi localization by measurments on Chest X ray			
	Age (years)	LP Right bronchi- BAL (mm)	LP Left bronchi- BAL (mm)	LP BAL- sternal carina (mm)	LP Hyoid bone-sternal carina (mm)
Mean	63	25	27	27	118
Std Dev	16	5	6	6	11
Confidence Interval	+/-4	+/-1	+/-2	+/-2	+/-3

Fig. 31 50 X-Rays (Men = 26, women = 24) have been analyzed. Normality test passed. *LP* lower perpendicular, *BAL* bi-axillary line

Finally, the distance between the hyoid bone and the SC is about 12 cm. As the PB are located after the bifurcation, this information constitutes another useful way for the localization the right and left PB by bedridden patient.

Competing interests
None.

O83

Study of efficacy on ICU acquired weakness of early standing with the assistance of a tilt table in critically ill patients

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Introduction Critically ill patients frequently develop muscle weakness, which is associated with prolonged intensive care unit and hospital stay (1). This randomized controlled trial (Clinical Trials NCT02047617) was designed to investigate whether a daily training session using a tilt table, started early in stable critically ill patients with an expected prolonged ICU stay, could improve strength at ICU and hospital discharge compared to a standard physiotherapy program.
Patients and methods The study protocol was approved by an ethics committee and informed consent was obtained from all patients. Patients admitted in adult ICU of Marie Lannelongue hospital, France, who were mechanically ventilated for at least 3 days were included. Exclusion criteria were cerebral or spinal injury, pelvic or lower limb fracture. Patients were assessed each day for temporary contraindications for mobilization out of bed (RASS score <−2 or >1; hemodynamic instability; a continuous intravenous dose of epinephrine/

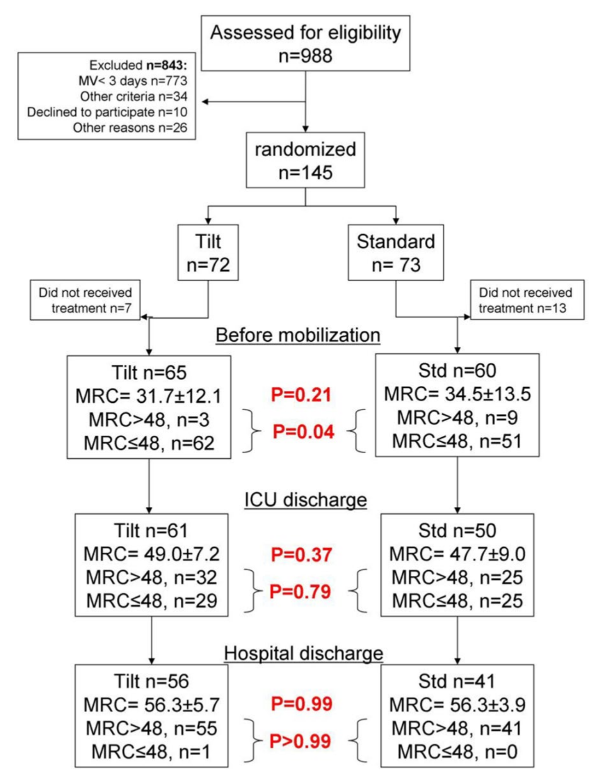

Fig. 32 See text for description