

BRONCHOSCOPIC OR NON-BRONCHOSCOPIC BRONCHOALVEOLAR LAVAGE (BAL) FOR DIAGNOSING PNEUMONIA IN ICU.

S. Aubas, S. Bartholomee, J.P. Roustan, H. Darbas, J. du Cailar.

Two BAL techniques were compared in 38 mechanically ventilated patients with suspected pneumonia : protected non bronchoscopic BAL (Mini BAL 20 ml injected) and bronchoscopic BAL (B-BAL 2 x 50 ml injected). BAL fluid differential cell count was performed on 39 pairs of samples but the count was technically impossible (too few cells or only mucus recovered) in 10 % (4/39) B-BAL and in 28 % (11/39) Mini BAL (p<0.05). Bronchial contamination (>5% ciliated cells) was found in 17 % (6/35) B-BAL and 21 % (6/28) Mini BAL samples (NS).

Microscopic examination and quantitative culture were performed on 34 pairs of samples. B-BAL and Mini BAL positive or negative microscopic examination and positive or negative culture correlated (p< 0.001). Sterile B-BAL and Mini-BAL culture agreed in 8/15 cases (53 %). Out of the 19 positive pairs, culture results agreed on 27/32 (84 %) of the recovered microorganisms. With a diagnosis of pneumonia established on B-BAL quantitative culture ≥10³ CFU/ml, Mini BAL gave false negative results in 23 % (4/17) of cases of pneumonia and false positive results in 35 % (6/17) of cases without pneumonia (sensitivity : 76 % - specificity : 65 %). These results suggest that Mini BAL allows recovery of alveolar samples but its specificity appears lower than B-BAL in culture.

D.A.R. A - Hôpital Lapeyronie 34059 MONTPELLIER CEDEX FRANCE

DIAGNOSTIC VALUE OF ELASTIN FIBERS IN THE DIAGNOSIS OF VENTILATOR-ASSOCIATED PNEUMONIA.

M.El-Ebiary, A.Torres, J.González, M.Ferrer, J.Puig de la Bellucasa, M^a T.Jiménez de Anta, R.Rodríguez-Roisin.

We prospectively studied 70 mechanically ventilated (MV) patients by examination of endotracheal aspirates for elastin fibers, graded Gram's stain, and quantitative bacterial cultures. Patients were classified in four diagnostic categories established before initiation of the study: 1) definite infection (N=25); group A, 2) probable infection (N=20); group B, 3) uncertain status (N=15); group C, and, 4) control group; group D (N=10). All patients were on antibiotic treatment when the study was performed. Endotracheal aspirates were obtained sterilely, using a suction catheter. A purulent portion of the aspirate was mixed at a 1:1 ratio with 40% KOH, incubated at 37°C for 30 min. A drop was placed on a clean slide and a cover slip 22x40 mm was applied. The KOH resistant fibers were identified at x400 standard light microscopy. The KOH preparation was positive when the characteristic split-end fibers were detected. For analysis, patients with definite and probable infection, and patients of the uncertain status and control groups were grouped together. We found that elastin fiber positivity had a sensitivity of 36% and a specificity of 88% for infection. The presence of tracheal aspirates elastin fibers was more frequent in group A patients (16/45, 35.5%) as opposed to all colonized patients (3/25, 12%) (p<0.05). No correlation was found between the presence of elastin fibers and quantitative tracheal cultures nor with the Gram stain grades (r=-0.2 p:NS). Elastin fibers did not increase sensitivity of EA quantitative cultures using a cut-off point of 10⁷ cfu.ml⁻¹. The development of elastin fibers occurred most frequently during infection with Gram-negative bacilli (9/16). By contrast, MV pneumonia due to Gram-positive cocci, *Legionella*, or non bacterial agents uncommonly (2/19, 10%) gave positive KOH preparations. In conclusion, KOH preparation for elastin fibers is a rapid and simple marker of MV pneumonia and is useful to detect part of the cases caused by Gram-negative bacilli.

Servi de Pneumologia. Hospital Clinic. c/Villarroel 170. 08036 Barcelona. Spain.

Cerebral blood flow I

DOBUTAMINE INCREASES CEREBRAL BLOOD FLOW VELOCITY IN SEPTIC PATIENTS

J. Berré, D. De Backer, J.J. Moraine, C. Mélot, J.L. Vincent, R.J. Kahn.

Sepsis can be associated with a reduction in cerebral blood flow (CBF). Although, dobutamine (DOB) has been used to increase O₂ delivery in septic patients, its effects on the cerebral circulation have not been well defined. Therefore, the effects of increasing doses of DOB (0,2,4,6,8,10 and 0 mcg/kg/min) on the velocity in a middle cerebral artery (Vmca) were studied in 14 stable septic patients (39-72 years). The following parameters were recorded: heart rate (HR), mean arterial pressure (MAP), cardiac index (CI)(thermodilution), arterial and mixed venous blood gases and saturations. Vmca was measured by transcranial Doppler. The arteriojugular oxygen content difference (AJDO₂) and the cerebral oxygen extraction (CEO₂) were determined using a catheter inserted into the jugular bulb. Arterial PCO₂ and PO₂ remained constant (35±1 and 101±9 mmHg, respectively).

DOB,mcg/kg/min	0	4	8	10	0
HR, bpm	94±5	102±5*	108±5*#	118±5*#	97±5
MAP, mmHg	77±3	86±4*	83±4*	82±5*	72±4
CI, l/min/m ²	3.8±.3	5.0±.4*	5.7±.5*#	6.3±.5*#	4.1±.3
Vmca, cm/sec	68±6	74±7*	75±8*	80±7*#	69±7
AJDO ₂ , ml/dl	4.1±.2	3.7±.2*	3.6±.3*		4.1±.2
CEO ₂ , %	46±3	41±4*	40±4*		47±4

* p<.01 vs 0; # p<.01 vs previous value (±SE)
(two way ANOVA).

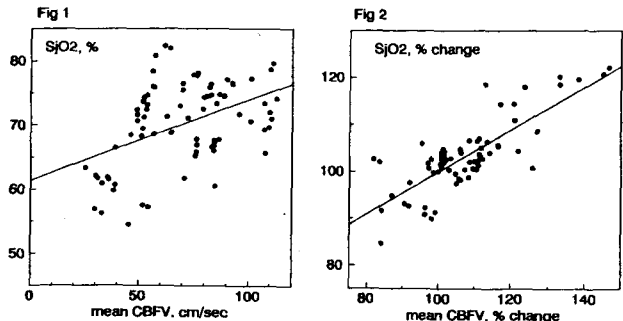
The increase in CI and MAP induced by dobutamine is associated with increased Vmca and AJDO₂, and with reduced CEO₂, suggesting an increase in CBF.

Dept of Intensive Care, Erasme University Hospital, Route de Lennik 808, 1070 Brussels, Belgium.

RELATIONSHIP BETWEEN TRANSCRANIAL DOPPLER MEASUREMENTS AND JUGULAR BULB HEMOGLOBIN SATURATION DURING AN INCREASE IN CEREBRAL BLOOD FLOW

J. Berré, D. De Backer, J.J. Moraine, C. Mélot, J.L. Vincent, R.J. Kahn.

We investigated the relationship between cerebral blood flow velocity (CBFV) and the oxyhemoglobin saturation into the jugular bulb (SjO₂) in 14 critically patients during an increase in cerebral blood flow induced by increasing doses of dobutamine (2,4,6,8,10 mcg/kg/min). Transcranial Doppler was used to measure CBFV. Statistical analysis included ANOVA for repeated measures and linear regression. There was a correlation between mean CBFV and SjO₂ (r=0.45, p<0.001)(Fig 1). There was a stronger correlation between changes in mean CBFV and changes in SjO₂ (r=0.80, p<0.001)(Fig 2).



The close relationship between changes in CBFV and SjO₂ during a dobutamine infusion suggests that either jugular bulb oximetry or transcranial Doppler can be used to assess changes in cerebral blood flow.

Dept of Intensive Care, Erasme University Hospital, Route de Lennik 808, 1070 Brussels, Belgium.

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JUGULAR BULB OXIMETRY AS A GUIDE TO THERAPY OF HEPATIC ENCEPHALOPATHY C.S. De Deyne, J.I. Poelaert, J.M. Decruyenaere, B. de Hemptinne, F.A. Colardyn.

Patients suffering from hepatic encephalopathy demonstrate wide variations in cerebral blood flow, ranging from very high to very low values, even among patients with the same neurologic status. These variations in cerebral blood flow could be monitored bedside by using jugular bulb oximetry, resulting in possible therapeutic implications.

Three patients suffering from fulminant hepatic failure (grade III-IV encephalopathy) underwent jugular bulb catheterization, using a 4fr Opticath (Abbott Oximetrix). High jugular oxygen saturation (=SjO₂) values (SjO₂>80%: luxury perfusion?) were treated with hyperventilation (PaCO₂ of 25 mmHg), low SjO₂ values (SjO₂<55%: cerebral hypoperfusion?) were managed with use of mannitol and normoventilation.

All 3 patients had initially very high SjO₂ values (> 80%), which returned to normal range after application of hyperventilation. So we were able to keep one patient neurologically stable during several days expecting liver transplantation (SjO₂ between 55-80%). In another patient, dramatically increasing SjO₂ values occurred during transplantation (SjO₂ of even 95%) which could only be decreased by the combination of severe hyperventilation (PaCO₂ of 20 mmHg) and administration of barbiturates. These therapeutic decisions seemed successful as this patient awakened after transplantation.

Adequate cerebral monitoring and therapeutic management of hepatic encephalopathy remains controversial. Estimation of cerebral blood flow changes by using jugular bulb oximetry could improve monitoring and therapy of these patients.

Depts. of Intensive Care and Transplant Surgery, Univ. Hospital Ghent, De Pintelaan 185, B-9000 Gent-Belgium.

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TESTING CO₂ REACTIVITY IN HEAD INJURY: THE ICP CHANGE REFLECTS THE AUTOREGULATION AND THE INTRACRANIAL COMPLIANCE.

N. Stocchetti, M. Barbagallo, G.C. Bellini, A. Vezzani, P. Zuccoli

Hyperventilation is widely used to control intracranial pressure (ICP) in head injured patients. The reduction of the CO₂ tension increases the cerebrovascular resistance, reducing the cerebral blood content and, therefore, the ICP. The ratio of ICP change over the CO₂ change is the Pressure Reactivity Coefficient to PCO₂ (PRCH) which is related to the severity and the time course of injury (A. Marmarou, ICP VII, 1989). Using the Pressure Volume Index (PVI) the changes in pressure caused by the hyperventilation can be translated in volume changes (Estimated Blood Volume Change, EBV). It is known that in response to the same change in volume a tight brain shows a greater change in ICP compared to a brain with normal compliance. In such a case the PRCH may reflect the impairment in compliance more than the CO₂ reactivity, with a "better" value due to the decreased PVI. In 28 male head injured patients in coma the CO₂ reactivity was tested every 12 hour measuring the PRCH and EBV, for a total of 218 determinations for each index. The mean age was 31.61 years (range 9-64), and the mean GCS on admission was 5.8. The mean PRCH was 1.06 (SD .71), while the mean EBV was 1.6 (SD 1.73). For each torr of CO₂ change the mean change in intracranial volume (Blood Volume response, BVR) was .689 (SD .68). The patients who died had a mean BVR of .13 (SD .06) while the patients who recovered or had a moderate disability had a mean BVR of .72 (SD .49). The correlation coefficient between the PRCH and the BVR was .39, indicating a low degree of association between the two variables. Some patients with a high PRCH, who are supposed to have a good reactivity, showed a very low change in EBV. In these cases the PRCH was an index of low compliance and not a index of good reactivity. In conclusion the CO₂ reactivity should be explored minding at the true changes in cerebral blood volume, and the changes in ICP produced by the CO₂ carefully interpreted.

N. Stocchetti Centro di Rianimazione Ospedale di Parma - Via Abbeveratoia, 14 43100 Parma Italy

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COMPARISON OF MANNITOL AND THIOPENTONE ON CPP AND SJO₂ DURING TREATMENT OF POST TRAUMATIC INTRACRANIAL HYPERTENSION.

S. Midgley, N.M. Dearden and J.D. Miller

Following development of intravascular oximetry there has been a resurgence of interest in continuous measurement of jugular bulb oxygen saturation (SjO₂) as a monitor of cerebral oxygen delivery. The effects of paired intracranial pressure (ICP) therapy using either mannitol (0.5 g/kg) or thiopentone 4mg/kg on ICP, cerebral perfusion pressure (CPP = mean BP - mean ICP) and SjO₂ were studied in 12 severely head injured patients managed by a standard regime. BP, ICP, SaO₂ (pulse oximetry), end tidal CO₂ and SjO₂ were displayed continuously and recorded at 1 minute intervals by microcomputer. ICP was treated at a threshold of 25 mm Hg. Each patient received both treatments. Therapy was considered successful if ICP rose or was maintained at 60 mm Hg or above and ICP fell to 20 mm Hg or less. Data was analysed at 1 minute intervals from the start of treatment to the point of minimum ICP using correlation-regression analysis.

Mannitol was successful in 8 patients and thiopentone in 4.

SaO₂ remained in excess of 97% and PaCO₂ between 3.8 and 4.2 kPa throughout. Pre-treatment values of CPP, ICP or SJO₂ did not predict treatment success. In those patients in whom therapy was successful there was a significant positive correlation between CPP and SJO₂ for both mannitol (r=0.815, p<0.001) and thiopentone (r=0.507, p<0.001). When the relationship between change in CPP and change in SjO₂ was examined in the same patients correlation was stronger with mannitol (r=0.919, p<0.001) than with thiopentone (r=0.421, p<0.001).

If haemoglobin concentration, arterial oxygen saturation and the position of the haemoglobin dissociation curve remain constant, SjO₂ is proportional to the ratio of global cerebral oxygen delivery to consumption. Successful ICP therapy is generally associated with an increase in SjO₂. SjO₂ monitoring determines whether ICP therapy improves the cerebral oxygen delivery to consumption ratio.

Department of Clinical Neurosciences, Western General Hospital, Crewe Road, EDINBURGH, EH4 2XU. U.K.

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TRANSCRANIAL DOPPLER SONOGRAPHY (TCD) IN HEAD-INJURED PATIENTS (HI).

F. Murillo-Cabezas, J.M. Dominguez-Roldan, A. Muñoz-Sanchez, J.L. Santamaria-Mifsut, F. Porras.

OBJECTIVES : The aims of this prospective study are to investigate: 1.- The effects of intracranial pressure (ICP) and cerebral perfusion pressure (CPP) on middle cerebral artery mean blood velocity (Vmca) and pulsatility index (PI) evaluated by TCD in the acute stage of head trauma, and 2.- The relationship between VMCA, PI and outcome. **MATERIAL AND METHODS** : In 38 HI, GCS 4-8 points (Mean GCS 5.33), mean age 27+12 years, ICP and CPP were recorded. Simultaneously, bilateral and repeated recordings of Vmca and PI were obtained. Mean values of ICP and CPP were compared to Vmca and PI by Student-t test. **RESULTS** : Mean values of ICP (mmHg), CPP (mmHg), PI and Vmca (cm/s) are displayed in table I. PI correlated negatively with CPP (r=-0.62). Correlation between Vmca and CPP was also significant (r=-0.53). Comparison between mean values of PI and Vmca and outcome are shown in table II.

TABLE I				TABLE II			
Vmca	ICP	CPP	PI	N	PI	Vmca	
44.1	33.3	63.9	1.9	Survivors	22	1.12	55.9
				Dead	16	2.98	30

CONCLUSIONS : Our data suggest that Vmca and PI in acute stage of head trauma are dependent upon CPP and ICP. PI and Vmca appear to an early prognosis factor of clinical outcome.

Servicio Cuidados Intensivos. Hospital Universitario Virgen del Rocío. Avda. Manuel Siurot s/n 41013 Seville Spain.