IL MONITORAGGIO DELL'EMORRAGIA SUBARACNOIDEA

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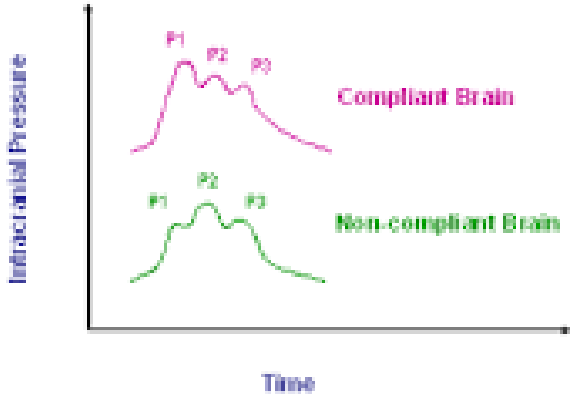
U.O. Anestesia e Rianimazione Ospedaliera

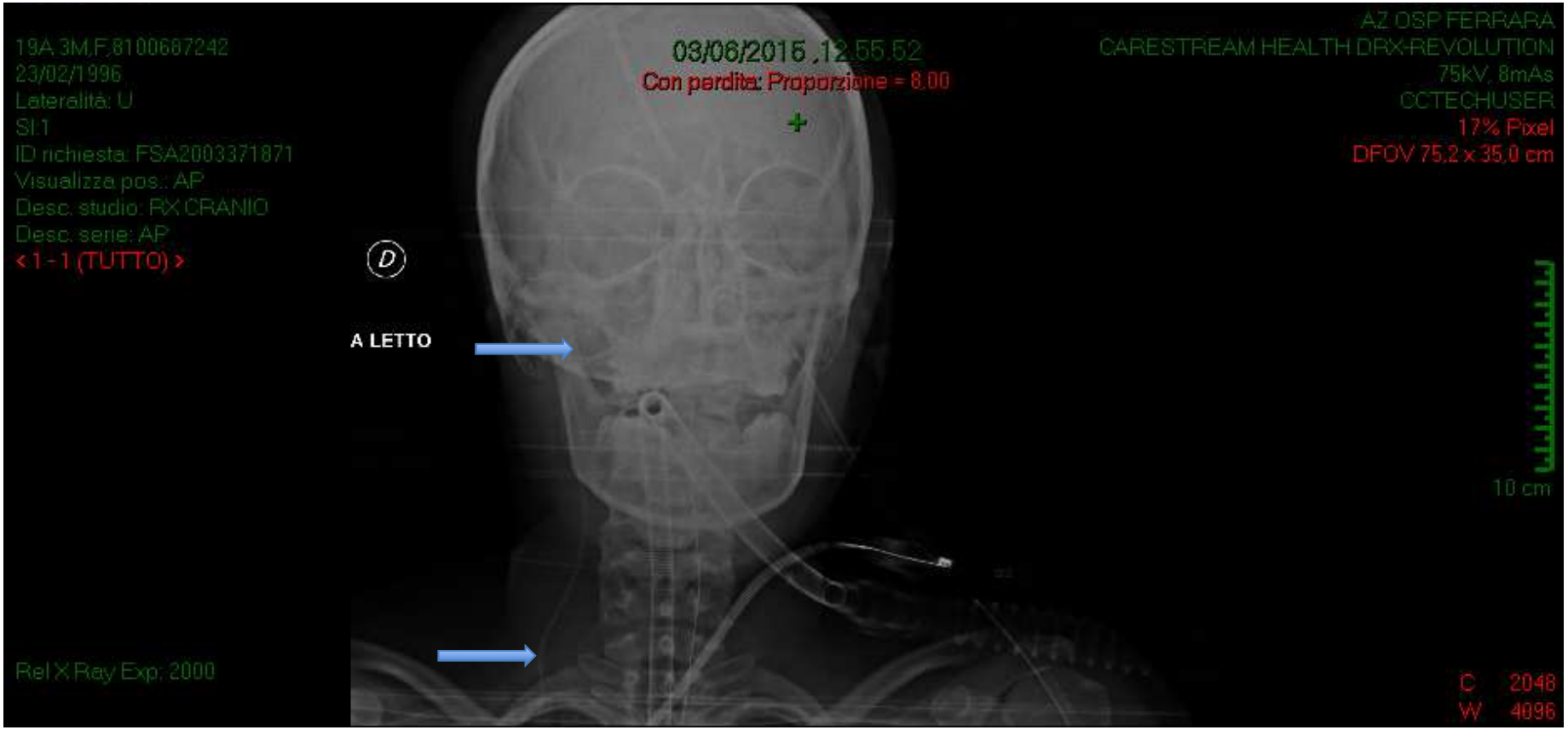
MONITORAGGIO

PIANO TERAPEUTICO

ICP

CPP


Intracranial Pressure
P1
P2
P3
Compliant Brain
P1
P2
P3
Non-compliant Brain
Time



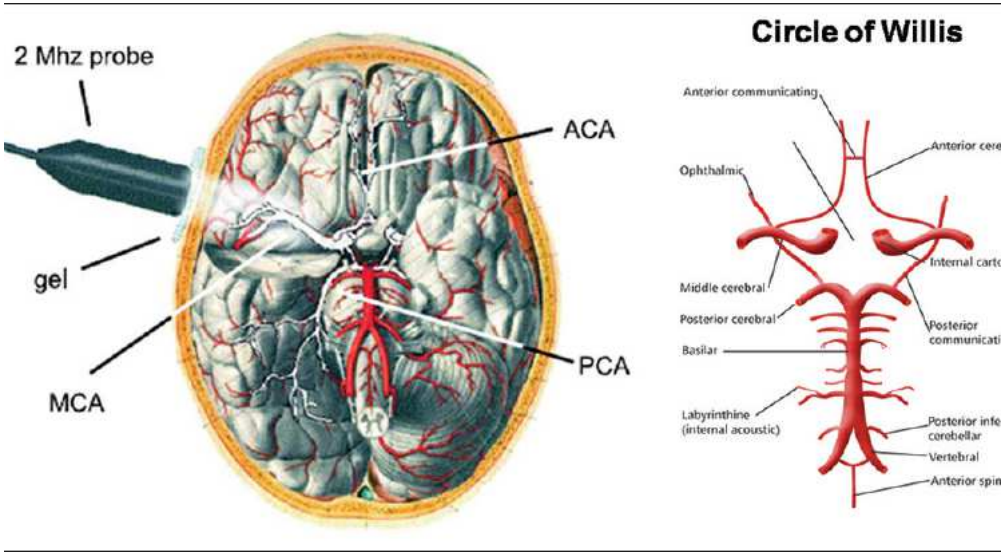
Catetere retrogrado giugulare

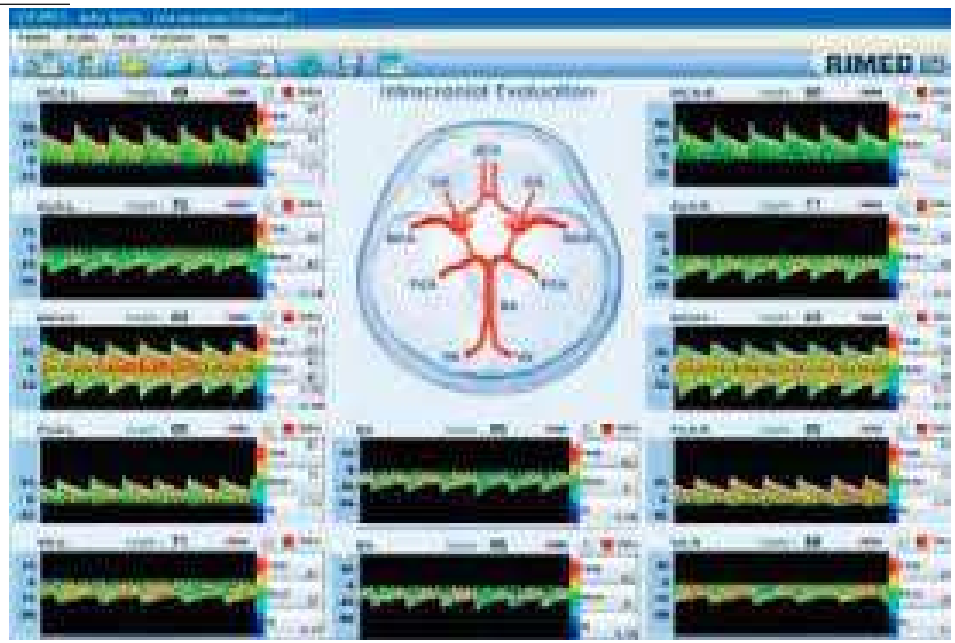
SjO2: 55-75% (valori normali)

d(a-j)O2= CBF/CMRO2 (4-7ml/dl)

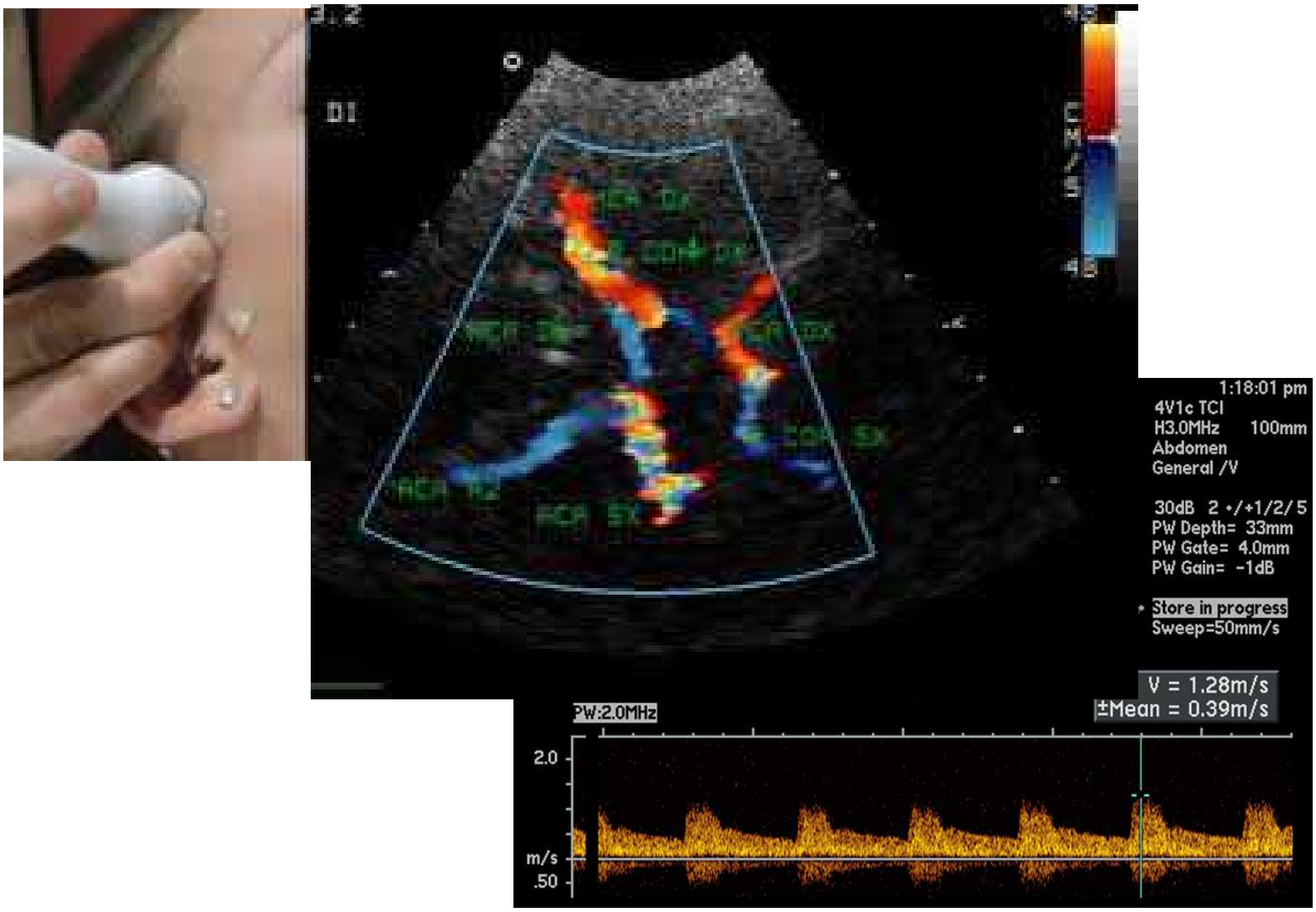
LOI: <0,08 nmoli/L

Doppler Transcranico

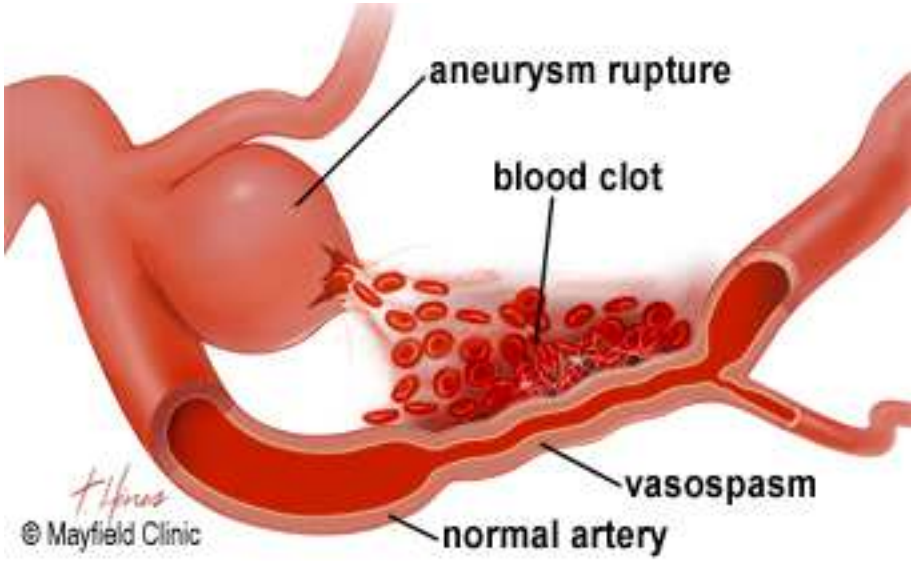


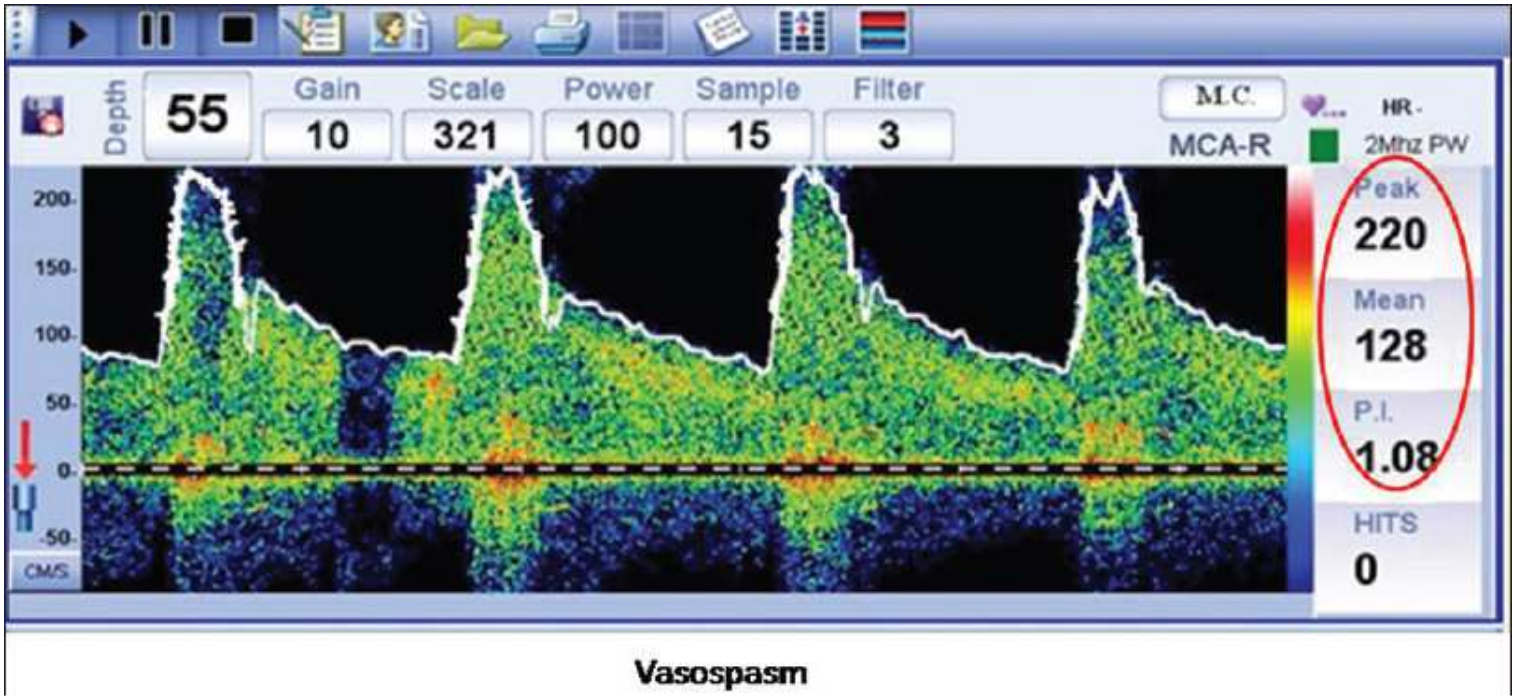


EcocolorDoppler Transcranico



VASOSPASMO





Vasospasm

GRAVITA' VASOSPASMO➔STENOSI

MCA vm 120-140 cm/sec: lieve ➔ 25%

MCA vm 140-200 cm/sec: moderato ➔ 25-50%

MCA vm >200 cm/sec: grave ➔ >50%

Indice di Lindegaard > 3

Delayed Cerebral Ischemia (DCI)

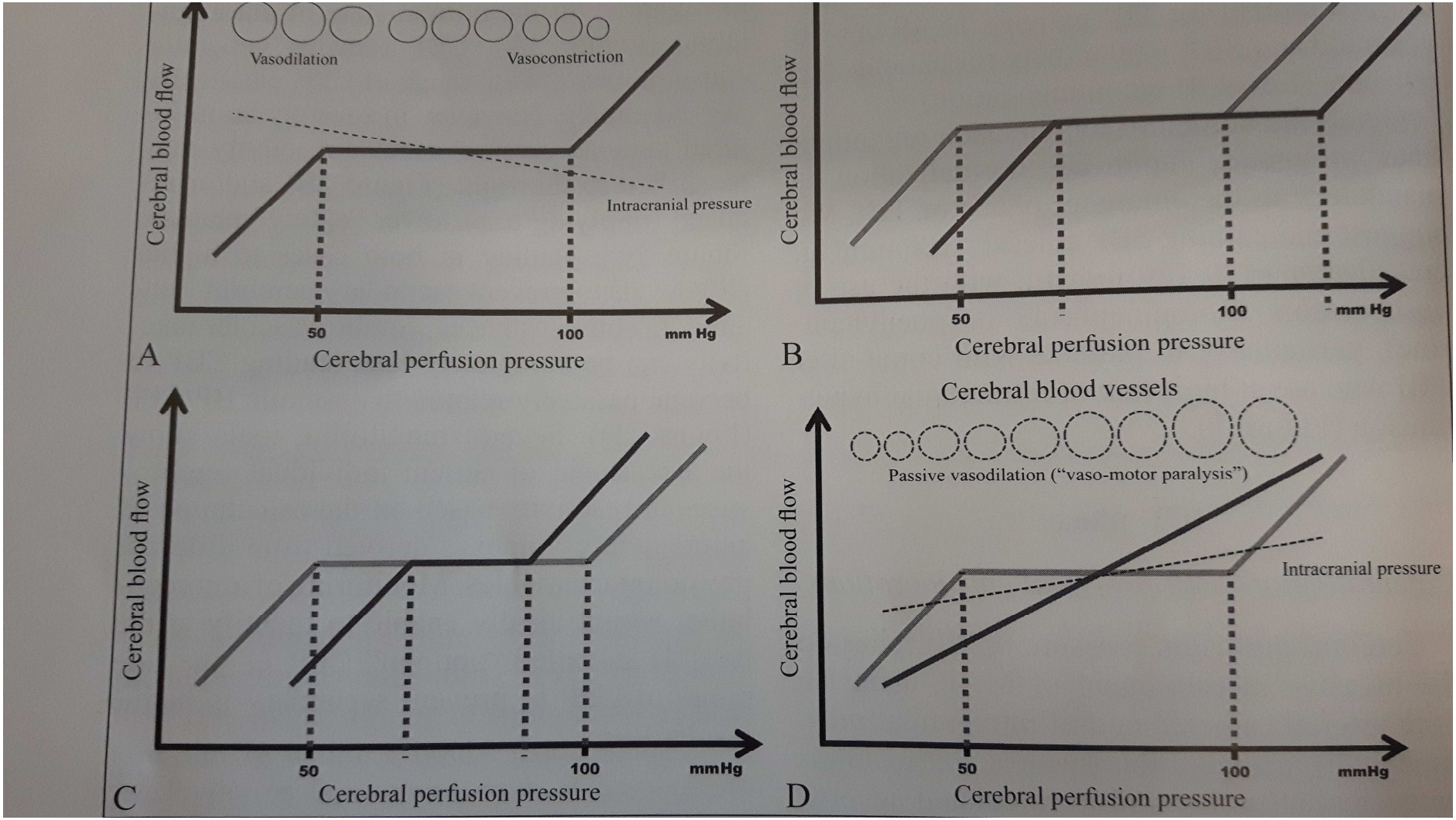
Table 3 Components of brain multimodality monitoring for poor grade SAH

Device	Physiological parameter measured	Normal range	Pathological condition
Continuous electroencephalography	Brain activity Epileptiform discharges	• Alpha/delta ratio > 50 % • No epileptiform discharges • Reactivity to stimuli	• Alpha/delta ratio < 50 % • Epileptiform discharges • No reactivity
Transcranial Doppler ultrasound	Mean blood flow velocity (FVm)	• FVm MCA: 30–75 cm/s	• MCA FVm 120–180 cm/s: intermediate probability of vasospasm • MCA FVm >180 cm/s: high probability of vasospasm
Cerebral blood flow monitor (Hemedex)	Cerebral blood flow (CBF)	• >40 ml/100 g/min	• <20 ml/100 g/min: indicative of ischemia assuming preserved metabolic demand
Jugular venous oximetry	Balance between oxygen delivery and consumption (SjO_2)	• 50–75 %	• <50 %; increased oxygen extraction fraction, indicative of ischemia
Brain tissue oxygen tension (Licox)	Regional parenchymal brain tissue oxygen tension (PbtO2)	• 25–35 mmHg in white subcortical matter	• <20 mmHg: indicative of cerebral hypoxia
Cerebral microdialysis	• Glucose • Lactate • Pyruvate • Lactate/pyruvate ratio • Glutamate • Glycerol	• 0.8–4.0 μmol/L • 0.7–3.0 μmol/L • Unknown • < 25 • 2–10 μmol/L • 10–90 μmol/L	• <0.2 μmol/L • ≥4.0 μmol/L • Unknown • >40 indicative of anaerobic metabolism • >10 μmol/L • >90 μmol/L

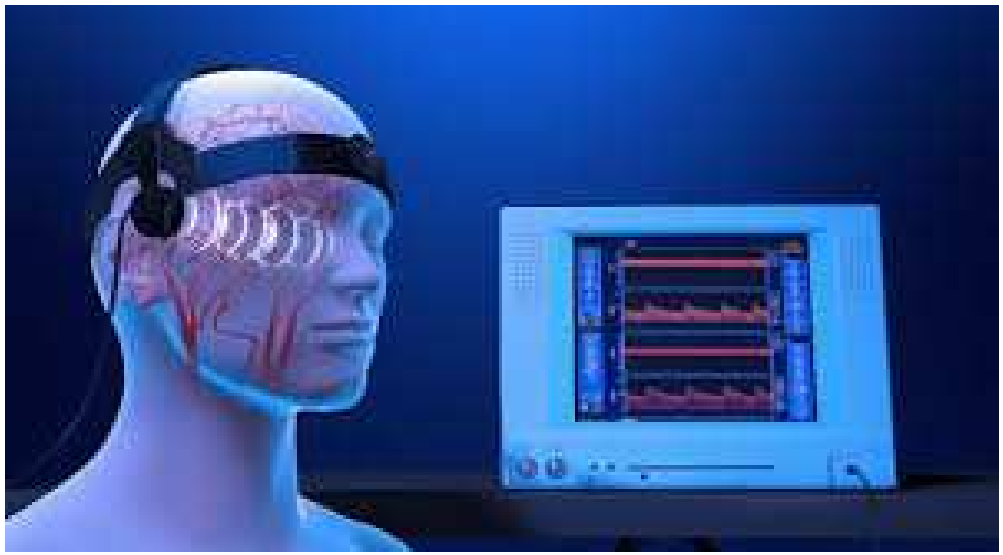
SAH subarachnoid hemorrhage

Francoeur and Mayer Critical Care (2016) 20:277

Autoregolazione meccanica alterata

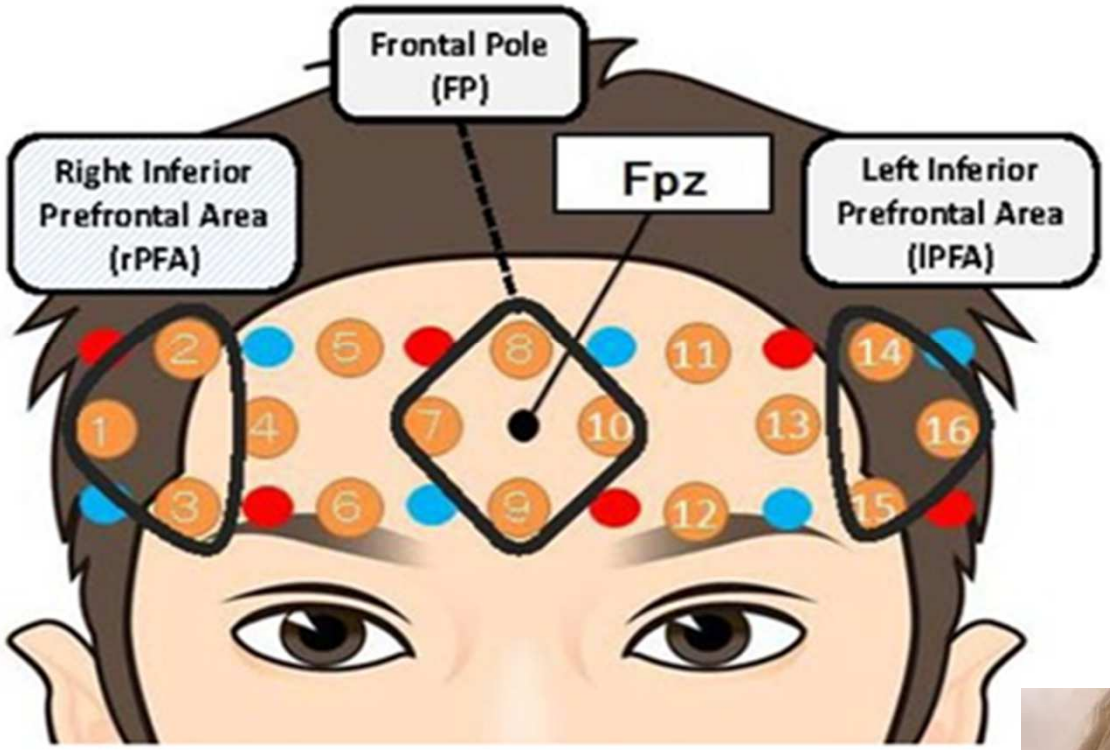


AUTOREGOLAZIONE CEREBRALE



Mean Velocity Time Index (Mx): correlazione MCA vm – MAP (oppure CPP)

NIRS (NEAR INFRARED SPECTROSCOPY)



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Anesthes. 2017;126(6):1187-1199. doi:10.1097/ALN.0000000000001625

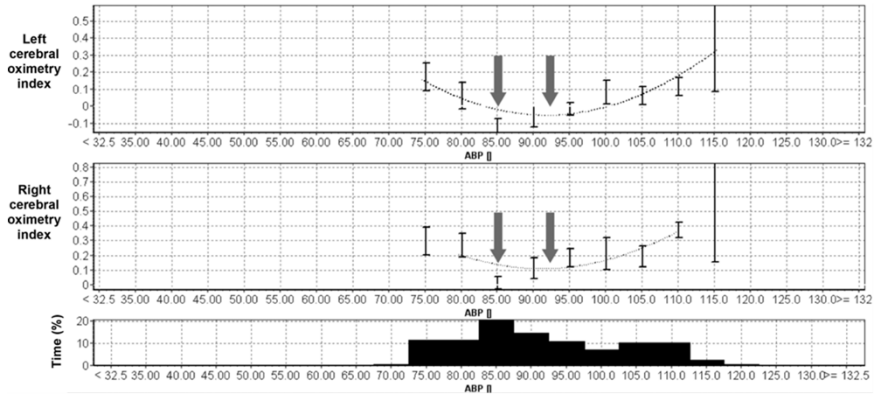

Figure Legend:

A representative 4-h monitoring period shows a difference of more than 5 mmHg between the optimal mean arterial blood pressures (MAPs), defined by the U-shaped curve, and the lowest cerebral autoregulation index. This patient presented with an intracerebral hemorrhage and was continuously monitored with near-infrared spectroscopy. The top graph shows the left cerebral oximetry index, the middle graph shows the right cerebral oximetry index, and the bottom graph shows the histogram of monitoring time in each bin. The first arrow (at 85 mmHg) represents the optimal mean arterial blood pressure defined by the U-shaped curve method, and the second arrow (at 93 mmHg) represents the optimal mean arterial blood pressure determined by the lowest cerebral autoregulation index method.

MONITORAGGIO

PIANO TERAPEUTICO INDIVIDUALIZZATO