

Cyrille Capel will defend his medical thesis of the University of Picardie Jules Verne concerning:

EVALUATION OF CERESPINAL FLUID DYNAMICS BEFORE AND AFTER TREATMENT OF CHIARI MALFORMATIONS

You are welcome to participate to this typical French medical event.

A welcome Aperó will be offered at the Logis du Roy after the defense to open the CSF symposium

Date: July 8th, 2015 at 6 PM

Venue: Le logis du Roy, Amiens, France



Président of the jury:
Pr Hervé DERAMOND, Head of the radiology department

Jury:
Professeur Patrick TOUSSAINT, Department of neurosurgery
Professeur Jean-Marc CONSTANS, Department of radiology
Professeur Johann PELTIER, Head of the neurosurgery department
Docteur Olivier BALEDDENT, Head of the image processing department

Supervisor :
Dr Anthony FICHTEN, Department of neurosurgery

Abstract

EVALUATION OF CEREBROSPINAL FLUID DYNAMICS BEFORE AND AFTER TREATMENT OF CHIARI MALFORMATIONS

Objective: The objective of this study was to observe the evolution of hydrodynamics and hemodynamics after treatment of Chiari malformation in two surgical procedures (with and without duraplasty).

Materials and Methods: We prospectively included nine patients who underwent surgery for Chiari malformation. Two surgical procedures were applied: occipital bone craniectomy and C1 laminectomy (5 patients), or bone decompression associated with duraplasty (4 patients). Each patient underwent MRI with complementary phase-contrast sequences during the preoperative evaluation. Postoperative MR-scan was performed one year after surgery. CSF stroke volumes within the ventricles, cervical, preontine cisterns, syringomyelia and at the foramen magnum level. were used as surrogate measures of brain hydrodynamics while brain hemodynamics were characterized via the quantification of cerebral blood flow, venous pulsatility, vascular expansion and venous correction factor analysis which quantifies the contribution of the jugular veins to the global cerebral venous drainage.

Results: 100% of the patients improved after surgery. 33% of patients kept minimal symptoms after treatment. Syringomyelia volume decreased after treatment. No clinical differences were found between the two types of surgery. Preoperatively, there was a decrease CSF stroke volume in the foramen magnum were lower than normal while unusual pulsations were noted in the cerebellar tonsils and medulla oblongata. Postoperative measurements reveal a decrease in CSF pulsatility within syringomyelia ($p = 0.04$), an increase in foramen magnum CSF stroke volume ($p = 0.03$), a decreased motion of the neuraxis at the level of the foramen magnum ($p = 0.03$) and a reduction in venous correction factor ($p = 0.01$). There was no difference in cerebral hydrodynamics and hemodynamics between the two types of surgeries. .

Conclusion: The presence of a groove at the foramen magnum restricts fluid exchanges between intracranial and spinal compartments. This blockage of CSF flushing during systole was partially offset by pulsations of the cerebellar tonsils and medulla oblongata, not present in normal subjects. The venous drainage study showed the establishment of drainage accessory pathways. This demonstrates that local blockage of CSF flow at the foramen magnum has a global impact on the patient's physiology.