Evaluation of ventriculosubgaleal shunt for post- hemorrhagic hydrocephalus.

Thesis

Submitted for the partial fulfillment of the M.S. degree

InNeurosurgery.

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2014

بسم الله الرحمن الرحيم

﴿قُلْ إِنَّ صَلَاتِي وَنُسُكِي وَمَحْيَايَ

وَمَمَاتِي لِلَّهِ رَبِّ الْعَالَمِينَ

(١٦٢)

لَا شَرِيكَ لَهُ ۖ وَبِذَٰلِكَ أُمِرْتُ

وَأَنَا أَوَّلُ الْمُسْلِمِينَ (١٦٣)﴾

صدق الله العظيم

سورة الأنعام

DEDICATIONS

To my dear Father ***Engineer AhmedWahdan****who was always supporting me.*

To my great Mother, who was the reason for where I am today, and without her support and encouragement, this work would have not been possible.

To my lovely sisters

To all my friends for their support.

ACKNOWLEDGEMENT

My first and greatest thanks are to ***ALLAH.***

The most gracious, most merciful for enabling me to complete this work successfully and for often putting so many good people in my way.

*I would like to express my deep appreciation and gratitude to my supervisor**Prof.Dr.Ahmed Zohdi**Professor of Neurosurgery, Faculty of Medicine, Cairo University for his incredible help, great care, stimulating suggestions and encouragement helped me in all the time of this work.*

I would like to express my great appreciation my supervisor ***Prof. Dr. SherifEl-Mekawy****Professor of Neurosurgery, Faculty of Medicine, Cairo University for his great help, stimulating suggestions and encouragement helped me in all the time of this work.*

I am heartily thankful ***to Dr.EhabEl-Refaee****, LecturerofNeurosurgery, Faculty of Medicine,Cairo University for his great help, support, supervision and suggestions. His intellectual and constructive opinions were essential to dress this work in its final form.*

My sincere thanks to all the staff members of Neurosurgery Department, Faculty of Medicine, Cairo University, and all those who shared in making this work possible.

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CLOA	Conscious level on admission.
CLOD	Conscious level on discharge.
EVD	External ventricular drain.
F.C	Fully conscious.
F/U CT	Follow up CT.
Hge.	Hemorrhage.
ICH	Intra cerebral hemorrhage.
IVH	Intraventricular hemorrhage.
NPH	Normal pressure hydrocephalus.
PPHH	Progressive post-hemorrhagic hydrocephalus.
SAH	Subarachnoid hemorrhage.
Spont.	Spontaneous.
V/S	Ventriculo-subgaleal.
VPS	Ventriculo-peritoneal shunt.

Abstract

Introduction:

The early management of post hemorrhagic hydrocephalus in premature infants is challenging and controversial. These infants need a temporary cerebrospinal fluid (CSF) diversion procedure until they gain adequate weight, and the blood and protein levels in CSF are reasonably low before permanent shunt can be placed. Various options areavailable with their associated advantages and disadvantages. Ventriculosubgaleal shunts have been recommended as a more physiologic and less invasive means of achieving this goal.

Patients and Methods: 21 patients with different age groups- 7 of each for comparison- (neonates, infants, children, adolescents) with post hemorrhagichydrocephalus underwent placement ofventriculosubgaleal shunts. We reviewed their clinical and imaging progress to assess the ability of the shunt to control hydrocephalus and the complication rates.

Results: In all 21 patients, the V/S shunt controlled the progression of hydrocephalus. A permanent shunt was placed in 9 patients. One patient required revision of the subgaleal shunt after slippage, two patients developed infection and two CSF leak.

Conclusions: V/S shunt for CSF diversion offers a simple, effective and relatively safe means of treating hydrocephalus in the neonate, with a low risk of complications and the possibility of avoiding permanent shunting.

Keywords: CSF infection; Temporary CSFdiversion; Ventriculomegaly Hydrocephalus; Intraventricular Hemorrhage.

INTRODUCTION

Hydrocephalus: is an active distension of the ventricular system of the brain arising when an imbalance exists between cerebrospinal fluid production and absorption that can occur as consequence to intraventricular hemorrhage. Intracranial pressure elevation impedes brain perfusion and augments secondary brain injury hindering recovery. Rapid restoration of normal intracranial pressure is mandatory in decreasing mortality and morbidity ***(Tubbs et al., 2005).***

The idea of ventriculosubgaleal (V/S) shunt evolved in 1896 when von Mikulicz described a procedure for diverting intracranial fluid into the subgaleal space. Similarly, Cushing in1928 and Davidoff in1929 described it for the relief of hydrocephalus ***(Tubbs et al., 2003).*** In 1977 Perret and Graf reported this method for temporary relief of hydrocephalus associated with tumors ***(perret et al., 1977).***

V/S shunt can be placed even in neonates and premature infants. In 1995, **Zohdi and Salem** published a series of cases proving the efficacy of this technique for cases presenting with acute hydrocephalus on emergency basis.

The V/S shunt offers an adequate procedure with relatively-short operative time if closed external ventricular drainage system is not available and has definitely a lower risk of infection than external ventricular drain (EVD).

Intraventricular hemorrhage (IVH):

It is one of the more serious neurological complications of the neonatal period ***(Fulmer et al., 2000)***

With improvements in neonatal intensive care the life expectancy of premature infants has increased with increased rate of clinically significant IVH within early neonatal period. IVH is estimated to occur in about 45% of infants weighing less than1500 g ***(Gray et al., 1995).***

It occurs only rarely in the full-term infants and in these situations, prompt investigations to rule out coagulopathy or vascular malformation should be done. ***(Shooman et al., 2009).***

Progressive post hemorrhagic hydrocephalus is an important and not uncommon complication of IVH in the premature infant. Its management remains controversial. ***(Fulmer et al., 2000; Wilson-Costello et al; 1990)***

Permanent shunt placement in these low-birth-weight infants is associated with several complications, with the most common shunt obstruction. Therefore, temporary treatment strategies to arrest the progression of ventricular enlargement until the infants are ready for a definitive shunting procedure are implemented **(Lemons JA et al., 1996).**

A variety of techniques are currently utilized including cerebrospinal fluid (CSF) inhibitors, serial lumbar punctures, ventricular taps, CSF reservoirs, and extra ventricular drainage each of these techniques has its advantages and disadvantages ***(Koksal ,1995).***

AIM OF WORK

In this study all patients different age groups who had hydrocephalus secondary to intracranial hemorrhage were included, whether neonates, infants or children and young adults.

This study was conducted to evaluate prospectively the V/S shunt for post-hemorrhagic hydrocephalus.

To prove value of evaluation which was guided by the conscious level, degree of fullness of the subgaleal pocket, controlled by CT imaging.

FUNCTIONAL ANATOMY OF THE CEREBROSPINAL FLUID PATHWAYS

The ventricular system:

The ventricles of the brain include the paired lateral ventricles, 3rd and 4th ventricles.

Lateral ventricles (ventriculus lateralis):

The two lateral ventricles are irregular cavities situated in the lower and medial parts of the cerebral hemispheres, one on either side of the midline. They are separated from each other by a median vertical partition, the septum pellucidum, but communicate with the 3rd ventricle and indirectly with each other through the interventricular foramena of Monro. They are lined by a thin membrane; the ependyma covered by ciliated epithelium and contain cerebrospinal fluid. Each lateral ventricle is a C-shaped cavity which extends from its anterior horn in the frontal lobe in a continuous curve posteriorly (central part), then inferiorly, and finally anteriorly, to end in the temporal lobe as the inferior horn. From its convex posterior surface a posterior horn extends backwards to a variable extent into the occipital lobe**.**

The size and shape of this ventricle is very variable. In the young, the walls lie almost in opposition, while with increasing age and loss of neural tissue the ventricle expands and may reach a considerable size without an increase in its internal pressure ***(Gray et al., 1995)*****.**

The anterior horn or cornu of the lateral ventricle curves inferiorly into the frontal lobe from the interventricular foramen. It is triangular in coronal section .The narrow floor is formed by the rostrum of the corpus callosum; the roof and anterior wall by the trunk and genu of the corpus callosum; the vertical medial wall by the septum pellucidum and column of the fornix; the lateral wall by the bulging head of the caudate nucleus ***(Drake et al., 2010).***

The central part of the ventricle: Also called body of the lateral ventricle, it is roofed by the trunk of the corpus callosum. Its medial wall, which decreases in height as it is followed posteriorly, is formed by the fornix and septum pellucidum anteriorly, and by the fornix posteriorly.

The floor consists from lateral to medial of the following structures:

- The caudate nucleus.
- The thalamostriate vein runs anteriorly in the groove between thalamus and caudate nucleus.
- The stria terminalis runs with the thalamostriate.
- A narrow strip of the dorsal surface of the thalamus.
- The choroid plexus.
- The fornix: anteriorly it is a rounded bundle but posteriorly it becomes progressively flattened and extends laterally into the floor of the lateral ventricle.

The posterior horn or cornu begins at the splenium of the corpus callosum, and extends posteriorly into the occipital lobe, tapering to a point. The roof, lateral wall, and floor are formed by a sheet of fibers (tapetum) from the splenium of the corpus callosum.