The utility of the ventriculo-subgaleal shunt- A therapeutic note

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Resumen

Una revisión de la literatura con respecto a la Derivación ventriculo-subgaleal, efectuada en los últimos diez años, reveló que actualmente ésta intervención Ventriculo-subgaleal (VSGS) se ha empleado principalmente para el tratamiento de la hidrocefalia post-hemorrágica de los prematuros[6,8,13,16]. Si bien su uso en ese contexto ha mostrado resultados alentadores, la derivación ventriculo-subgaleal tiene ventajas significativas en el tratamiento de otras condiciones para las cuales, al parecer, no se utiliza con frecuencia actualmente. Esta nota terapéutica intenta llamar la atención de la comunidad neuroquirúrgica sobre esta intervención y despertar el interés de nuestros colegas en esta técnica.

Palabras clave: Hidrocefalia, derivativa ventriculo-subgaleal**.**

Abstract

A literature review following the heading "Ventriculosubgaleal shunt" for the last ten years, revealed that currently the Ventriculosubgaleal shunt (VSGS) is been mainly employed for the treatment of posthemorrhagic hydrocephalus of the premature[6,8,13,16]. While his use in that context has shown encouraging results, VSGS has significant advantages in the treatment of quite a few other conditions, for which it does not seem is currently been utilized. This therapeutic note has been written in an attempt to call the attention of the neurosurgical community to this situation and to spark the interest of our colleagues in this technique.

Key words: Hydrocephalus, ventriculosubgaleal shunt.

Introduction

In spite of the pioneer efforts by von Mikulicz[15] and Cushing[2] among others, by the end of the XIX century in their attempts to devise an effective therapy for diverse types of hydrocephalus, it was only the development of antibiotics and the dawn of silicones, both in the 1940´s what allowed the development of a less risky and more efficient treatment. These advances made possible the experience of Perret and Graf who in their influential article of 1977[10] propelled the modern development of the ventriculo-subgaleal shunt (VSGS).

Characteristics of VSGS

This type of shunt is constituted by a ventricular catheter introduced into a lateral ventricle through a simple burrhole in the parietal area of the skull, leaving its other end inserted in a subgaleal pocket created, during that same procedure, by a careful dissection of the subgaleal space neighboring the burrhole. This type of shunt offers a method for temporary control of diverse hydrocephalic processes[5,10] and present an intermediate therapeutic modality between external ventricular drainage[2,4] with its well-known potential complications, and a permanent shunt, which is not always appropriate or feasible.

Discussion

Considering that the length and the caliber of the implanted catheter does not change and that the cerebrospinal fluid viscosity does not present usually significant variations, it becomes evident that, following Pascal and Poiseuille hydraulic laws, the cerebrospinal fluid flow, from the lateral ventricle to the subgaleal pocket, will be regulated by the resultant between the intraventricular pressure and the opposing pressure present within the subgaleal pocket, without the need for and interposed valve. The pressure within the subgaleal pocket is generated by the difference between the amount of liquid drained into it and its absorptive capacity. In the subgaleal pocket the absorptive capacity gradually decreases due to a progressive impermeabilization of its inner wall by the formation of a layer of serosal cells that block the passage of cerebrospinal fluid into the scalp tissues[3]. Because this blockage is not compensated by an equivalent reduction in the amount of cerebrospinal fluid drained into it, the pressure within the subgaleal pocket will unavoidably increase gradually to the point of blocking the system function, situation that usually occurs within a period of three weeks. It is this absorptive capacity of the subgaleal pocket the only important limitation of the VSGS, and considering this, and in an empirical fashion, a very careful dissection while creating the subgaleal pocket is recommended to avoid possible hemorrhages in its interior that could affect its absorptive capacity and, moreover, make the pocket as wide as the cosmetic effect would allow, thus increasing the absorptive surface and prolong that way as much as possible the function of this shunt.

The advantages of the VSGS are: a) Been a closed system, able to decompress temporarily the ventricular system for a period of about three weeks, relieving the symptoms of increased intracranial pressure and improving the general condition of the patient, till that time when a definitive procedure can be carried out in better conditions; b) Due to the anatomical position of its components in their relation to the ventricular system, this type of shunt, as opposed to permanent shunts, does not include a syphon and for that reason it is exempt of the frequent complications due to that phenomenon seen in other types of shunts[11]; c) Because the subgaleal tissue is not affected by the limitations imposed by the blood-brain barrier and due to its lesser length and simplicity, the VSGS offers a better response to treatment of associated infectious processes, when compared with the one offered by permanent shunts[7,14].

In spite of the fact that the VSGS was promoted as a procedure to temporarily treat a range of hydrocephalic processes[5,10], a present thorough review of the pertinent literature reveals that this type of shunt is been almost exclusively utilized in the treatment of the post-hemorrhagic hydrocephalus of the premature[6,8,13,16]. Although it is clear that in that context the VSGS has given positive results, there are a number of other indications for VSGS that seem to have been forgotten and deserve implementation.

Examples of some of those include:

a) Its use in pediatric cases of posterior fossa tumors as a step prior to the definitive surgery[1]. It provides the necessary time to stabilize the patient, improve his general condition and carry out the necessary diagnostic studies without urgency.
b) A similar situation occurs in cases of obstructive hydrocephalus due to a cerebellar infarction. Here the insertion of a VSGS prior to the needed posterior fossa decompression not only assists in stabilizing the patient but it also seems to improve his prognosis[9].
c) Another indication for VSGS exists in cases of acute hydrocephalus in the course of a subarachnoid hemorrhage, causing impairment in the state of consciousness. Here, the implantation of an external ventricular drainage carries not only the risk of ventriculitis but it also could result in rebleeding. Another alternative would be the implantation of a ventriculo-peritoneal shunt but it also carries the risk of rebleeding. Moreover, the high protein and the erythrocytes present in the CSF could block that system[12]. In that setting the VSGS presents a better choice: The simplicity and short length of that system makes it less prone for blockage. Furthermore the absence of a syphon and the pressure within the subgaleal pocket tends to decrease somewhat the ventricular drainage making it less likely to cause rebleeding.

Conclusion

The VSGS offers a different therapeutic option, capable of temporarily control a range of diverse hydrocephalic processes. It requires a simple and fast surgical technique exposing the patient to few and less severe complications than the ones present with homologous procedures. These advantages support its more frequent utilization.

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